THE REVIEW OF APPLIED ENTOMOLOGY.

SERIES A: AGRICULTURAL.

VOL. X.

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ERRATA

Page	Line	For	Read
Page 2	line 20	for " xxxv "	read " xxxvi "
,, 18	,, 15	,, " *linearius* "	,, " *linarius* "
,, 31	,, 44	,, " *melanoscelis* "	,, " *melanoscelus* "
,, 34	,, 40	,, " *Gnaphalocrocis* "	,, " *Cnaphalocrocis* "
,, 36	,, 16	,, " NILSON-EHLE (H)."	,, " NILSSON-EHLE (H.)."
,, 39	,, 22	,, " *Aganoxena* "	,, " *Agonoxena* "
,, 49	,, 41	,, " SMITH (K. N.)."	,, " SMITH (K. M.)."
,, 49	last line	,, " *P. roae* "	,, " *P. rosae* "
,, 54	line 28	,, " *laricis* "	,, " *laricio* "
,, 54	,, 40	,, " *Limneriun* "	,, " *Limnerium* "
,, 58	,, 43	,, " *Calamogrostis* "	,, " *Calamagrostis* "
,, 59	,, 2	,, " *Agropyrum* "	,, " *Agropyron* "
,, 62	,, 16	,, " *Eriosoma* (*Aphis*) *grossulariae* "	read " *Aphis grossulariae* "
,, 69	,, 42	,, " *hemorrhoidalis* "	read " *haemorrhoidalis* "
,, 83	,, 37	,, " *capraea* "	,, " *caprea* "
,, 90	,, 23	,, " *Hyposcoma* "	,, " *Hyposmocoma* "
,, 90	,, 29	,, " *sallei* "	,, " *sallaei* "
,, 97	,, 53	,, " *punctilaris* "	,, " *punctularis* "
,, 109	,, 29	,, " Blakeslie "	,, " Blakeslee "
,, 110	,, 6	,, " *militaris* "	,, " *miliaris* "
,, 121	,, 39	,, " *mungo* "	,, " *aureus* "
,, 124	,, 32	,, " *Zonoceros* "	,, " *Zonocerus* "
,, 147	,, 27	,, " 1922 "	,, " 1921 "
,, 151	,, 43	before " attacked " insert " fatally "	
,, 162	lines 32 & 36	for " *hyphantria* "	read " *hyphantriae* "
,, 166	line 9	for " viii "	,, " ix "
,, 166	,, 25	,, " *Heniscospilus* "	,, " *Henicospilus* "
,, 167	,, 12	,, " Schiner "	,, " Schimer "
,, 169	lines 29 & 52	for " cotton bollworm "	,, " cotton boll-weevil "
,, 190	line 39	for " *oryzivorus* "	,, " *oryzivorus* "
,, 190	,, 40	,, " *quatuorpustulat* "	,, " *quadripustulata* "
,, 194	,, 45	,, " *australis* "	,, " *australica* "
,, 195	,, 7	,, " *Phragmitiphila* "	,, " *Phragmatiphila* "
,, 197	,, 7	,, " *Carthartus* "	,, " *Cathartus* "
,, 197 / 251	,, 17 / ,, 4	,, " *Hypomoscoma* "	,, " *Hyposmocoma* "
,, 273	,, 1	,, " Japanese "	,, " Javanese "
,, 282	lines 25 & 43	for " *noronhea* "	,, " *noronhae* "
,, 282	line 49	for " *Microcentrus* "	,, " *Macrocentrus* "
,, 282	,, 50	,, " *indi* "	,, " *india* "
,, 366	,, 45	,, " *Chematobia* "	,, " *Cheimatobia* "
,, 374	,, 16	,, " Lead arsenite "	,, " Lead arsenate "
,, 375	,, 46	,, " *Nacoleia* (*Notarcha octasema*).	read " *Nacoleia* (*Notarcha*) *octosema*."
,, 382	,, 29	,, " *spermatrophus* "	read " *spermotrophus* "
,, 383	,, 23	,, " *tesselatum* "	,, " *tessellatum* "
,, 390	32	" *Pongania* "	" [illegible] "

ERRATA—*cont.*

Page 410	line 36	for	" *Parexoristes* "	read	" *Parexorista* "
,, 410	,, 42	,,	" STRANŇÁK (Fr.)."	,,	" STRAŇÁK (Fr.)."
,, 421	,, 9	,,	" RUHMAN (M. H.)."	,,	" RUHMANN(M.H.)'
,, 426	lines 6 & 7	for	" *Chalcytes* "	,,	" *Chalcites* "
,, 432	line 25	for	" DODRODEEV (A. I.).'	,,	" DOBRODEEV (A. I.).'
,, 468	,, 10	,,	" *Porinia* "	,,	" *Porina* "
,, 551	,, 7	,,	" with "	,,	" which "
,, 563	,, 46	,,	" *serratilineela* "	,,	" *serratilineella* "
,, 592	,, 7	,,	" *ilicola* "	,,	" *ilicicola* "
,, 606	,, 25	,,	" *rosea* "	,,	" *rosae* "
,, 611	,, 39	,,	" with 1 part sulphur "	,,	" with 1 part calcium arsenate, 1 part sulphur
,, 614	,, 36	,,	" *succintus* "	read	" *succinctus* "

IMPERIAL BUREAU OF ENTOMOLOGY.

REVIEW

OF

APPLIED ENTOMOLOGY.

SERIES A.

VOL. X.] [1922.

ILLINGWORTH (J. F.). **The Linear Bug,** *Phaenacantha australica*, **Kirkaldy : A new Pest of Sugar-cane in Queensland.**—*Queensland Bur. Sugar Expt. Sta., Div. Ent., Brisbane*, Bull. 14, 1921, 11 pp. 2 plates.

The bulk of the information here given on *Phaenacantha australica*, Kirk., has already been noticed [*R.A.E.*, A, ix, 9, 89]. Its natural enemies also include a fungus. The eggs of the Reduviid, *Pristhesancus papuensis*, which is predacious on *P. australica*, are deposited in clusters on the leaves of sugar-cane, where a parasitic Chalcid, *Anastatus* sp., is often found associated with them.

Insects Injurious to Plant Life.—*Cyprus Agric. Jl., Nicosia*, xvi, pt. 3, July 1921, pp. 53–54. [Received 31st October 1921.]

Particulars are given of the results of the visit of Mr. G. Storey to Cyprus to investigate the scale-insects, *Aspidiotus hederae* and *A. lataniae*, which had been observed in Egypt on lemons and oranges coming from that island. *A. hederae* was not found at all in lemon-growing districts, but was abundant on wattles, oleanders and other shrubs, and occasionally on carobs. The species supposed to be *A. lataniae* proved to be *A. cydoniae*, which is already known in Egypt. The most injurious scale on *Citrus* in Cyprus is *Chrysomphalus* (*A.*) *aurantii*, which is also prevalent in Egypt.

The olive moth [*Prays oleellus*], olive leaf-miner (*Cecidomyia* sp.) nd a scale-insect (*Aspidiotus* sp.) were abundant on olives in Cyprus. hese have not been recorded in Egypt, and may prove dangerous the importation of olive trees and green olives is allowed. The leopard moth (*Zeuzera pyrina*) was abundant in the branches and twigs of olives, pomegranates and Rosaceous plants, but it is also common in Egypt. The olive Psyllid [*Euphyllura olivina*] is abundant on the trunks of olive and carob trees, which are not likely to be exported to Egypt.

PARODI (L. R.). **Enfermedades de las Plantas.** [Plant Diseases.]—*Gaceta Rural, Buenos Aires*, xv, no. 170, September 1921, pp. 197–199.

The preparation of the more usual insecticides is described, and ormulae are given for kerosene-soap emulsion, tobacco extract, oil nd flour paste, lysol, creolin and lime-sulphur. Two methods of eparing hydrocyanic acid gas for fumigation are also described.

GABOTTO (L.). **L'Afide lanigero o Pidocchio sanguigno del Melo.** [The Woolly Apple Aphis.]—*Riv. Agric., Parma,* xxvi, no. 43, 28th October 1921, pp. 624–625.

This article deals with measures against the woolly aphis [*Eriosoma lanigerum,* Hsm.], those advised being pruning, the removal of small colonies and spraying with petroleum-soap.

DENIER (P.). **Les Insectes nuisibles au Cotonnier dans les Colonies Françaises.**—*Rev. Hist. Nat. App., Paris,* 1ère Partie, ii, no. 9, September 1921, pp. 265–271.

The cultivation of cotton in the French Colonies is not as yet sufficiently developed to require a special entomological service, and very little is known regarding cotton pests occurring there. The chief insects injuring the crop in other countries are here reviewed, and it is suggested that as the cotton industry is developed in the French Colonies, it would be very advantageous to have centres for experimental research with laboratories on the spot. It is hoped that public authorities, scientific men and planters will collaborate in the many investigations that will be necessary.

(E. F.). **Société de Pathologie Végétale.**—*Jl. Agric. Prat., Paris,* xxxv, no. 43, 29th October 1921, pp. 350–352.

The reports made to the Société de Pathologie Végétale of insect pests and fungous diseases include a record of the fruit-fly, *Ceratitis capitata* (?), on pears in a new area, at Villeneuve-Saint-Georges. *Criocephalus rusticus* has been observed causing serious damage to pieces of timber in the Seine-et-Marne district. *Hylotrupes bajulus* is the only other Longicorn known to live in similar conditions, this beetle, as well as *Sirex juvencus,* being found during the same observations. *Criocephalus* has previously been recorded as perforating zinc plates in order to escape from timber in which the larva had developed.

The caterpillars of the nun moth, *Liparis monacha,* have been causing very heavy depredations in the valuable forests of Czecho-Slovakia. The severest attacks were noticed three years ago in northern Bohemia, and the moth has now spread to Moravia. The majority of trees and herbaceous plants are devoured by the caterpillars; a few that seem to be immune are *Abies douglasi,* pears, ash, elm and generally limes. Conifers suffer more than deciduous trees. The German system of afforestation has probably encouraged this insect owing to the trees being very closely planted. The caterpillars are most abundant in the undisturbed valleys. It is hoped that this infestation will die out naturally, especially as two serious epizootics occur among the caterpillars, namely, flacherie and polyhedral disease. An attempt is being made to spread these diseases by spraying infested trees with a culture obtained from caterpillars that have died of them. New foci of the diseases have been created in this manner. Serious damage by *L. monacha* has also been observed during 1918–1920 in the forests of Belgian Limburg, though the attack was less severe than in Czecho-Slovakia; in Belgium the underwood was not injured. It has been suggested that the young plantations should be protected by lead arsenate sprays, and that mixed stands should be grown.

The question whether tree-trunks with their bark on should be permitted entry into France from Czecho-Slovakia is discussed. *L. monacha*

already occurs in France, and the fact that it does not become a serious pest there indicates that conditions are not favourable to it. On the other hand, there may be some danger in importing from Central Europe individuals that may differ from the indigenous ones in their choice of food-plants. Another pest prevalent in Czecho-Slovakia, the Pyralid, *Loxostege (Phlyctaenodes) sticticalis*, causes considerable damage to the beet crops, and is believed to be able to survive on other plants, such as fruit trees or conifers.

McColloch (J. W.). **A Method for Studying the Hessian Fly and other Insects.**—*Ann. Ent. Soc. Amer., Columbus, Ohio,* xiv, no. 3, September 1921, pp. 227-230, 1 fig.

A method of growing plants in a nutrient solution instead of in soil to facilitate life-history studies of insects proved so effective when tried in connection with the study of *Mayetiola destructor*, Say, that it has been successfully adapted in connection with studies on *Blissus leucopterus*, Say (chinch bug), *Toxoptera graminum*, Rond. (green bug) and *Aphis maidis*, Fitch (corn-leaf aphis). The technique of this method and its many advantages are discussed. Pfeffer's solution was used, the preparation of which is described.

Ewing (H. E.). **New Nearctic Spider Mites of the Family Tetranychidae.**—*Proc. U.S. Nat. Mus., Washington, D.C.,* lix, no. 2394, 1921, pp. 659-666, 1 plate.

The new species described include *Oligonychus americanus*, which causes considerable damage to leaves of spruce in Canada; *O. major*, on avocado in Maryland; *Bryobia brevicornis*, on lucerne in Arizona; *Syncaligus quercus*, on leaves of oak in New York; and *Tetranychina tritici*, causing injury to wheat in Idaho.

A key is given to distinguish the new species of *Bryobia* from *B. praetiosa*, Koch.

Isaakidès (C. A.). **La Lutte contre le** *Dacus* **en Chalcidique, dans le Pélion et en Messénie.**—*Minist. Agric. (Serv. Phytopath.), Athens,* 4th April 1921, 48 pp., 3 plates. [Received 31st October 1921.]

The loss caused to the olive industry by *Dacus oleae* (olive fly) in parts of Greece is estimated as being about 30 per cent., not only the oil production but also the crop of olives for table use being seriously affected. The early efforts, begun about 15 years ago, to check these depredations are reviewed. In 1918 a law was passed, which is appended to the present report, establishing a Commission for the purpose of protecting olive trees from insect pests and diseases or providing for their treatment when infested. A tax is imposed upon infested districts for this purpose, and, in return, ingredients and implements for treatment will be distributed, with instructions for their use. The organisation and supervision of the technical work of the Commission are entrusted to the Phytopathological Service.

Treatment was carried out during 1920 on a large scale, the spray chosen as having given indications of the best results being composed of 3 parts (by weight) of sodium arsenite to 100 parts of molasses and 900 parts of water. Any larger proportion of sodium arsenite resulted in injury to the trees, and the mixture even at this dilution

produced occasionally a little scorching of the fruit owing to rapid evaporation during the hottest hours of the day in the summer months. The method of organising the campaign and of spraying the trees (some of which, on steep slopes, were difficult to treat) is described. Four treatments were given in early June, towards the end of July, end of August and end of September. The success obtained was beyond expectation, the value of the crop saved in the Pelion district alone being calculated at over £514,000 (13,000,000 drachmae, at par).

The author is convinced that the best means of combating injurious insects is the biological method, and to this end scientific men in various countries are endeavouring to find insect enemies of *D. oleae* that could be established in Europe. At the same time technical methods should be studied, improved wherever possible and maintained as auxiliary measures.

Local reports from the different districts where spraying was carried out are appended, with estimates of the cost of the treatments and of the increased production and profits arising therefrom.

HIRST (S.). **On some new or little known Acari, mostly parasitic in Habit.**—*Proc. Zool. Soc., London.*, 1921, pt. 2, June 1921, pp. 357–378, 15 figs.

The new genus *Acarapis* is proposed for *Tarsonemus woodi*, Rennie [*R.A.E.*, A, ix, 275, 338], infesting the honey bee, and the structural differences between it and *Tarsonemus* are described.

SCHEIDTER (F.). **Das Tannensterben im Frankenwalde.** [The Dying of Silver Firs in the Frankenwald.]—*Naturw. Zeitschr. Forst.- u. Landw., Stuttgart*, xvii, no. 3, March 1919, pp. 69–90.

The dying-back of silver firs in the Frankenwald is considered to be due to close planting; this encourages the attacks of fungi and insect pests, of which *Pissodes piceae*, Ill., *Ips curvidens*, Germ., and *Cryphalus piceae*, Ratz., have much increased. Other common pests are *Sirex augur*, *S. noctilio*, *Xyloterus lineatus* and *Hylecoetus dermestoides*.

P. piceae, which is the most important, chiefly attacks trees aged from 40 to 80 years.

JABLONOWSKI (J.). **A bor-vagy eczetmuszlicza.** [The Wine or Vinegar Fly.]—*Természettudományi Közlöny, Budapest*, liii, no. 771–774, 15th October 1921, pp. 269–281, 6 figs.

The synonymy of *Drosophila melanogaster*, Mg. (*oenophila*, Lw.*), is discussed. This fly is very common and occurs everywhere, usually swarming in fermenting substances.

The egg and larval stages are described. In summer the life-cycle occupies twelve days, but in winter, even in partly heated buildings, it lasts 60–70 days or more. The larva does not feed on fermenting or decomposing matter itself, but upon the jelly-like layer that covers such substances, owing to the presence of a yeast or other micro-organism. It develops in liquids only when they are thick enough, or covered by a film such as that produced in vinegar-making by *Mycoderma*. The larvae feed on the organism concerned in this process, and are partly submerged in the fluid, but with the tracheae

issuing from the film. The bionomics of these larvae are discussed at length. These facts explain the constant occurrence of this fly in the fermentation of dough when bread is being baked, as made in Hungary, as well as its presence in wine-cellars that are not kept properly clean.

The author explains the phenomenon called by the French "vin cochylisé," *i.e.*, the occurrence of diarrhoea among the workers in vineyards during or before the vintage. This used to be erroneously attributed to excessive eating of grapes, and latterly to the fact that they are dusted with copper sulphate and lime. The fact is that *D. melanogaster* is the actual carrier of this infection and conveys the various organisms concerned from human excreta to the ripening grapes, while from infected bunches of grapes to others they are carried by the larvae of the two vine-moths, *Clysia* [*ambiguella*] and *Polychrosis* [*botrana*], which attack the vine in Hungary.

JABLONOWSKI (J.). **A gyümölcsöskert védelme az élősködők ellen.** [The Protection of Orchards against Pests.]—*Budapest*, Patria Pubg. Co., 2nd Edn., 1921, 164 pp., 24 figs.

In this work, divided into twelve chapters, the methods of protecting orchards from insect pests throughout the year are dealt with. Considerable space is devoted to the methods of spraying to be adopted and to various insecticides, including the use of combined sprays against insects and fungi. Special attention is given to the woolly aphis [*Eriosoma lanigerum*] and other Aphids, codling moth [*Cydia pomonella*] and winter moth [*Cheimatobia brumata*], and the final chapter is devoted to cockchafers [*Melolontha melolontha*] and their control.

TONDUZ (A.). *Remigia repanda* **(Gusanos de Pasto).** [*Remigia repanda*, the Grass Moth.]—*Bol. Agric. Ind. & Com., Guatemala*, i, no. 3, July 1921, pp. 109–112. [Received 1st November 1921.]

Spraying is not recommended against the grass moth, *Remigia punctularis* (*repanda*), because insecticides and the requisite apparatus are too costly for use in Guatemala. The larvae of this Noctuid may be collected or crushed; trenches containing lime will trap and kill large numbers, besides affording protection against invasion.

BERTI-CERONI (A.). **Un Endofago della Tignola del Grano.** [An endophagous Parasite of the Grain Moth.]—*L'Umbria Verde, Spoleto*, x, no. 4, October 1921, pp. 50–51.

This note records the author's discovery of a Chalcid parasite of *Sitotroga cerealella*, Oliv., which lays from six to eight eggs in the larvae of the moth. The presence of this Chalcid in grain may be taken as an indication that the moth is very numerous. Under certain conditions it has checked a severe infestation. A skin eruption that has been attributed to it is due to the presence of the Acarid, *Pediculoides ventricosus*.

GOWDEY (C. C.). **The Fall Army Worm,** *Laphygma frugiperda*, **S. & A.** —*Jamaica Dept. Agric., Kingston*, Ent. Circ. 4, 1921, 4 pp.

There was an extensive outbreak of the fall army worm (*Laphygma frugiperda*, S. & A.) in Jamaica in 1920. This Noctuid is indigenous to the United States and South America, being most abundant in

the tropics. Its life-history and food-plants have already been noticed [*R. A. E.*, A, i, 517]. There are three or, at the most, four generations a year, the most destructive brood appearing in August and early September. In favourable seasons each generation becomes more destructive and numerous than the last. Aestivation is passed in the pupal stage. Maize is attacked in the same way as by *Heliothis obsoleta* (*armigera*), the young caterpillars eating the tender sheathed leaves and the older ones the forming ears.

Preventive measures include clean cultivation and rotation of crops. An effective poison bait placed at the base of the food-plant consists of 60 lb. bran, 1 lb. Paris green or London purple, the pulp and juice of three oranges, ½ gal. molasses and 3½ gals. water. The fields should be cleared of grass and weeds, and the application carried out in the late afternoon or after sunset. Dusting is ineffective unless the food-plant has a broad leaf surface. If this must be practised, lead arsenate is recommended, as there is a risk of scorching with Paris green or London purple. Furrows may be dug round a heavily infested area and the caterpillars massed in them destroyed by burning or spraying with kerosene. Where the moths are collected at light traps, the majority of the females will be found to have already deposited their eggs. In Jamaica the natural enemies include the parasites, *Frontina aletiae*, *Archytas piliventris*, *Henicospilus purgatus*, *Chalcis robusta* and *Spilochalcis femorata*, and the predacious Carabid, *Calosoma laterale*.

SKAIFE (S. H.). **Notes on some South African Entomophthoraceae.** —*Trans. R. Soc. S. Africa, Cape Town*, ix, pt. 1, 1921, pp. 77–86, 3 plates.

The fungi dealt with in this paper were collected in Natal and comprise: *Empusa muscae*, attacking Muscid flies; *E. conglomerata*, attacking the imago of the Tipulid, *Nephrotoma umbripennis*, Alex.; *E. grylli*, attacking Orthoptera and, according to Thaxter, Lepidoptera and Diptera also; *Entomophthora aphidis*, effectively checking several species of Aphids; *E. megasperma*, attacking larvae of *Euxoa segetis*, Schiff.; and *E. apiculata*, attacking the following: Lepidoptera—imagines of the Noctuid, *Lycophotia muscosa*, Geyer, and larvae of *Pachypasa capensis*; Diptera—imagines of a large Anthomyiid fly and of *Nephrotoma unicingulata*, Alex.; Coleoptera—imagines of *Trochalus fulgidus*, Fhs., and *Adoretus ictericus*, Burm.; and Rhynchota—adults of the Cercopid, *Locris arithmetica*.

CUSHMAN (R. A.) & GAHAN (A. B.). U.S. Bur. Ent. **The Thomas Say Species of Ichneumonidae.**—*Proc. Ent. Soc., Washington, D.C.*, xxiii, no. 7, October 1921, pp. 153–171.

A revised synonymy is given of the 61 Ichneumonids described by Say; these are treated alphabetically under the genera in which they were originally placed.

CRAWFORD (J. C.). **A new Species of the Chalcidid Genus** ***Zatropis*** **(Hym.).**—*Proc. Ent. Soc., Washington, D.C.*, xxiii, no. 7, October 1921, pp. 171–172.

Zatropis tortricidis, sp. n., a parasite of *Polychrosis viteana*, Clem.,

Departmental Activities : Entomology, August 1921.—*Jl Dept. Agric., Union S. Africa, Pretoria*, iii, no. 4, October 1921, pp. 306–309.

Experiments are being made in the Cape Province to ascertain whether it is possible to create a controllable supply of mealy bugs [*Pseudococcus*] for the maintenance of the predacious Australian Coccinellid, *Cryptolaemus montrouzieri*, which has not yet become established in South Africa.

Great damage has been caused to *Eucalyptus* by the larvae of a weevil, the life-history of which is being investigated. A species of *Dorylus* caused considerable injury to cabbage and kale by gnawing off the bark below the ground. The ants were probably attracted by moisture, but the plants were apparently not entirely attacked for food, as the ants gnawed irregular holes in the stems, presumably to serve as an entrenchment against *Pheidole punctulata*. The soil should be kept firm and moist around injured stems to allow of the formation of new roots.

Icerya purchasi, Mask., is reappearing in certain pear orchards in the Western Province, the variety "Winter Nelis" being chiefly attacked. When the trees are sprayed with lead arsenate against codling moth [*Cydia pomonella*], *I. purchasi* becomes coated with the poison, but is not affected by it, whereas the Coccinellids, *Novius cardinalis*, are greatly reduced in numbers. An attempt is being made to re-establish the beetles by breeding them at the experiment station and liberating them in large numbers on the infested trees.

The spring colonies of woolly aphis [*Eriosoma lanigerum*] are being actively attacked by native Coccinellids such as *Exochomus nigromaculatus*, *Oenopia cinctella*, *Chilomenes lunata*, and *Alesia* sp. The establishment of *Aphelinus mali* has not yet been proved. It is possible that its work is hindered by the Coccinellids, as the latter probably reduce its food supply at a critical time, and may also devour freshly parasitised Aphids.

Pettey (F. W.). **How the Fruit Grower may more effectively control Codling Moth.**—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iii, no. 4, October 1921, pp. 357–365, 1 fig.

Codling moth [*Cydia pomonella*] is one of the worst pests of pears and apples in South Africa, but it may be effectively controlled by spraying with lead arsenate, provided the operation is properly carried out. The various points to be considered in spraying orchards are dealt with. The efficacy of the treatment is greatly augmented if the thinning of the crop in October, November and December is practised, with special attention to the removal and destruction of infested fruit. Infestation from the fruit-shed should be avoided, and infested windfalls should be regularly collected. It is also advisable to band severely infested trees and collect the larvae from the bands at intervals of two weeks.

The spraying experiments here recorded show that the effect of lead arsenate is somewhat reduced by the addition of Bordeaux mixture, *e.g.*, 2½ lb. lead arsenate paste in 50 gals. Bordeaux resulted in 10–18 per cent. more infested fruit than when 50 gals. water were substituted for the Bordeaux, and the same amount in 40 gals. Bordeaux resulted in about 4 per cent. more infested fruit than when 40 gals. water were used. Less than 1¼ lb. lead arsenate powder to

40 gals. water should not be used, especially in the first two applications. The time of application of the sprays is most important and differs according to the varieties of tree to be treated. The best time for treating some of the commoner varieties of apple is discussed.

BALLOU (H. A.). **The Brown Hard-back Grub in Antigua** (*Lachnosterna antiguae*, **Arrow**).—*West Indian Bull., Barbados*, xix, no. 1, 1921, pp. 1–17. [Received 2nd November 1921.]

The early records of occurrence of the brown hard-back grub of Antigua (*Lachnosterna antiguae*, Arr.) since about 1911, when attention began to be drawn to it, are briefly reviewed. Within the last few years there seems to have been a general development of soil grubs as pests of sugar-cane in different parts of the world. In Barbados, the attacks of the root-borer, *Diaprepes abbreviatus*, and of the brown hard-back, *Lachnosterna* (*Phytalus*) *smithi*, have attained considerable importance, but planters do not seem to have formed any precise opinion as to the damage done to sugar-cane by the latter. Knowledge concerning *L. antiguae* has been obtained from observations extending over a number of years, largely during brief visits to Antigua. Details are given of extensive examinations of the soil, healthy and unhealthy cane plants and number of grubs present. These show that there is no characteristic appearance of the canes to indicate attacks by soil grubs. Perfectly healthy canes have been found in some very heavily infested spots, while badly diseased canes have been found where very few grubs were present. Neither is there any constancy in the numbers of grubs in the soil at the root of badly diseased canes. Generally speaking, it seems as though heavy soils, with insufficient drainage, contain more grubs than lighter soils, but heavy infestations were also occasionally found in healthy stools grown in light soils under good conditions.

The system under which sugar-cane is grown in Antigua is discussed. It is considered that the practice of forcing the land, especially that under contract to grow crops for the factory, is responsible for much of the so-called root disease, which is frequently attributed to cane grubs. The importance of proper agricultural practice, such as manuring, frequent tillage, the use of green dressing and drainage, and the introduction of a proper rotation crop at frequent intervals, is emphasised, root disease conditions having been eliminated by these methods.

A translation of Arrow's description of *L. antiguae* [*R.A.E.*, A, ix, 90] is given. The life-history has not been fully worked out. The first beetles issuing from the soil were collected on 8th March; those collected previously, from 29th January onwards, were either in pupal cells or at such a depth in the soil as to indicate that they were not ascending, although out of the pupal cell. Eggs were found in the soil in May and July in 1919. Grubs were found in the soil at all times from May 1919 to May 1920, and at all seasons there were full-grown larvae. Small and half-grown larvae are recorded from May to September 1919 and again in May 1920. Pupae were found in March 1919. The season for pupation and transformation to the adult seems to be a very definite one, the emergence of the adults from the soil seeming to depend upon sufficient rain to soften the surface of the soil. Attempts to rear the insect from egg to adult in confinement have been unsuccessful. The indications are that from 3 to 5 days are passed in the pre-pupal stage and from 17 to 25 as a

pupa. Newly emerged adults, when exposed to light, acquired the characteristic testaceous red colour in two days. Trials have been made to determine whether living plant material, such as roots, is necessary as food for the insect, and it appeared that decaying cane trash was preferred to the roots. Field observations confirm this, as grubs have been found in greater numbers where there was abundance of decaying matter than where there were plenty of living roots without decaying organic matter.

The only remedial measure that promises any success in reducing the numbers of the cane grubs in Antigua is the growing of a trap crop of maize, and collecting the grubs from the soil when the maize is pulled up. On one 10-acre estate 57,535 grubs were destroyed in this way before the young canes were planted.

The Scoliid parasite, *Tiphia parallela*, is present in Antigua, but its assistance in control seems to be practically negligible. It is suggested that the introduction of *Cordia interrupta*, a plant that has proved attractive to *T. parallela* in Barbados and Mauritius, might be advantageous.

Report on the Prevalence of some Pests and Diseases in the West Indies during 1919. (Compiled from the Reports of the Principal Local Agricultural Officers.)—*West Indian Bull., Barbados*, xix, no. 1, 1921, pp. 18-37. [Received 2nd November 1921.]

This is a résumé of various local reports, most of the information from which has already been noticed.

Ashby (S. F.). **The Red-headed Scale Fungus.**—*Agric. News, Barbados*, xx, no. 507, 1st October 1921, p. 319.

The red-headed scale fungus, which is frequently seen projecting from the margins of *Lepidosaphes beckii* (citrus mussel scale), and is one of its most important enemies in the West Indies, has been known for many years as *Sphaerostilbe coccophila*. This name, however, is now considered untenable, as it covers two distinct species. There are three species of the genus parasitic on the Coccids of the genera *Lepidosaphes, Aspidiotus, Parlatoria, Diaspis, Chionaspis* and related genera. These are *S. flammea*, widely distributed in the eastern and southern United States and Cuba; *S. aurantiicola*, probably the common form in the West Indies and also in Florida, Georgia and the Orient; and *S. coccidophthora*, known only from the Orient. The name *Microcera coccophila*, first applied to the conidial stage of *S. flammea*, and used for many years, is retained for that stage. All three species of *Sphaerostilbe* have stilboid *Microcera* stages difficult to distinguish from each other. As both *S. flammea* and *S. aurantiicola* occur in the Southern States, it is probable that both are present in some parts of the West Indies. *S. aurantiicola* is apparently the usual species parasitising *L. beckii* throughout the tropics and subtropics.

Walton (W. R.). **European Corn Borer in American Corn.**—*U.S. Dept. Agric., Washington, D.C., Yearbook 1920*, 1921, pp. 85-104, 7 figs. [Received 2nd November 1921.]

This paper contains an account of the European corn-stalk borer [*Pyrausta nubilalis*], and of its introduction into America, with particulars of its distribution, life-history, food-plants, and the damage caused by it. Remedial measures, including those undertaken by the Government, are also dealt with.

Coad (B. R.). **Killing Boll Weevils with Poison Dust.**—*U.S. Dept. Agric., Washington, D.C., Yearbook 1920*, 1921, pp. 241–252, 2 figs. [Received 2nd November 1921.]

As the result of a long series of experiments, which are here described, it has been proved that the cotton boll weevil [*Anthonomus grandis*] can be controlled by a calcium arsenate dust. Details are also given of suitable machinery for dusting. Experiments with this poison were extensively carried out in 1920, and the reasons for their success and failure are discussed [*cf. R. A.E.*, A, viii, 245, 302, 457].

McAtee (W. L.). **Farm Help from the Birds.**—*U.S. Dept. Agric., Washington, D.C., Yearbook 1920*, 1921, pp. 253–270, 18 figs. [Received 2nd November 1921.]

An account is given of the beneficial effects of the various birds that are predacious on injurious insects in the United States. The legislation on protection of birds is reviewed, and the need for encouraging their increase and preservation is emphasised.

Walton (W. R.). **The Green Bug or Spring Grain Aphis: How to Prevent its Periodical Outbreaks.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1217, June 1921, 11 pp., 9 figs. [Received 2nd November 1921.]

The spring grain aphis (*Toxoptera graminum*) is distributed throughout the United States and Canada, being particularly destructive in the Mississippi Basin in early spring. In 1907 an outbreak of this pest caused a loss of 50 million bushels of oats and wheat in one district and 70 per cent. of the wheat crop in another. This Aphid feeds on most graminaceous plants and small grains, but is chiefly injurious to wheat and oats.

The parthenogenetic females, which may be winged or wingless, are practically always present and produce young all the year round in the southern latitudes. The wingless egg-laying females occur in the north only in the autumn, and there the winter is passed in the egg, or as active nymphs or adults. South of the 35th parallel, except at high altitudes, breeding is continuous. The eggs are deposited in autumn and hatch in spring. The Aphids mature in 6 or 7 days and produce young. There may be at least 20 generations a year. A single female may produce 1–8 young a day for at least 2–3 weeks. The damage caused is recognised by the presence of yellow areas on the leaf blades, which turn reddish-brown and die.

Lysiphlebus (*Aphidius*) *testaceipes* is the chief parasite that keeps this pest in check. Unfortunately, as it can only multiply in comparatively warm weather, remedial measures are essential. The most important is the destruction of all self-sown crops, especially wheat and oats, during the summer and early autumn. This is essential in Texas, Oklahoma, Kansas and Missouri, where serious outbreaks are liable to occur at any time.

Fryer (J. C. F.) & others. **Report on the Occurrence of Insect and Fungus Pests on Plants in England and Wales for the Year 1919.**—*Minist. Agric. & Fisheries, London*, Misc. Pubn., no. 33, 1921, pp. 6–25. [Received 2nd November 1921.]

The pests damaging cereals in the year under review were: *Lema melanopa, Hylemyia coarctata, Oscinella* (*Oscinis*) *frit, Chlorops taeniopus* in barley, *Tylenchus scandens*, and wireworms. Experiments

on floating out the galls of *T. scandens* from contaminated wheat showed that salt solutions containing 15 to 20 per cent. sodium chloride were completely successful against this Nematode. Germination was not at all affected after one day's immersion and hardly at all after six.

Potatoes were generally attacked by Aphids, *Rhopalosiphum dianthi* and others. It has not yet been ascertained whether the death of the tissues surrounding the puncture is due to a toxin introduced by the Aphids or not. Infested plants were severely injured by spraying with Burgundy or Bordeaux mixtures, probably as a result of the copper salts being introduced through the Aphid punctures. Aphids also attacked turnips and swedes in late summer. Mangels were seriously injured by a flea-beetle, *Plectroscelis concinna*. Pulse crops were damaged, locally, by *Aphis rumicis*, and *Sitona* spp. were particularly troublesome in the Midlands and East Anglia. Dusting with a powder containing pyridine again proved effective, and where the attack was not serious a light spraying with lead arsenate prevented damage.

Pasture and forage crops were injured by *Tylenchus*, but the outbreak of *Charaeas graminis* in the Peak district, Yorkshire, and the northern counties has apparently subsided.

A serious outbreak of *Malacosoma* (*Clisiocampa*) *neustria* (lackey moth) is recorded from Kent and other southern counties. In one area over 1,000 acres of fruit were involved. Spraying was effective when applied early, but once the trees were covered with webbing only mechanical measures were of any use. *Hyponomeuta padellus* was abnormally injurious. Tortricids were also numerous on apple; against them spraying with lead arsenate at double strength (1 lb. paste to 10 gals. water) gave good results in some cases. Nicotine proved generally effective against Capsids on apples. The woolly aphis [*Eriosoma lanigerum*] is becoming increasingly abundant and destructive, and serious losses were also caused by *Anthonomus pomorum* in all districts. *Hyalopterus pruni* was the most injurious Aphid on plums, especially in the southern half of the country. *Hoplocampa fulvicornis* (plum sawfly) and *Cydia* (*Opadia*) *funebrana* were unusually prevalent.

The roots of strawberry plants were severely damaged by the larvae of *Phyllobius*, the loss being estimated in some cases at a ton of fruit per acre.

A list of all the insects recorded during the year is given, arranged under the various crops attacked.

HENRIKSEN (K. L.). **Oversigt over de danske Coccidae.** [A Review of Danish Coccidae.]—*Ent. Medd., Copenhagen*, xiii (2nd Ser. viii), no. 7, 1921, pp. 305–317.

The subject matter of this paper is indicated by its title. It contains keys to the subfamilies and to some of the species concerned.

NECHLEBA (—). **Nonne in Böhmen.** [The Nun Moth in Bohemia.]—*Oesterr. Forst- u. Jagdzeitg.*, xxxvi, 1918, pp. 207–208. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 4–12, 31st March 1921, p. 189.)

Even during the great outbreaks of the nun moth [*Liparis monacha*] in Central Europe at the end of the last century no extensive injury was done in the Pürglitzer forests in Bohemia. Since then, however.

the nun moth has occurred there yearly, the first serious damage being done in 1917, owing to the lack of Tachinid and other parasites. In 1918 the outbreak was excessively severe, and there is a danger of its spreading to the whole of Central Bohemia.

Slavik (V.). **Die Nonne. Die praktische Nonnenkontrolle im Walde und wie man den Nonnenschäden vorbeugen kann.** [The Nun Moth. Practical Nun Moth Control in the Forest and Methods for Preventing Injury.]—*Allgem. Forst- u. Jagdzeitg., Vienna,* xxxviii, 1920, pp. 96–99, 110–111. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liii, no. 15–21, 10th May 1921, pp. 447–448.)

As a result of work carried out in Central Bohemia it is recommended that the forests administration should not be required to collect all stages of the nun moth [*Liparis monacha*], as only 2–3 per cent. can be collected, and those are chiefly sickly larvae; the exception to this is the destruction of newly hatched larvae when still gregarious. Thinning should be avoided in infested stands, and must be done in winter only; if done between August and April it is useless as a remedial measure, while between April and August it favours the increase of the moth. Felling should be done in good time in threatened stands, especially at the centres of infestation. In all infested stands trap-trunks for bark-beetles must be provided. All timber produced in such stands must be entirely barked, and all defoliated stands must be cut and barked. Mixed stands and stands of deciduous trees should be planted. Steps must be taken to produce a good banding adhesive for isolating infested stands, but healthy trees should not be banded.

Kadocsa (G.). **Múlt 1916 évitenyészeteimböl: II. A vörös fenyömoly tenyésztési és néhany szó életmódjáról.** [My Breeding Results in 1916: II. The Breeding of *Coleophora laricella*, Hb., and a few Notes on its Habits.]—*Rovortani lapok*, xxiv, 1917, pp. 89–90. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liii, no. 4–12, 31st March 1921, p. 225.)

An outbreak of the caterpillars of *Coleophora laricella*, Hb., on *Larix europaea* is recorded at Budapest. The adult moth appears in May and deposits its eggs on the needles, into which the larvae bore on hatching a fortnight later. At the end of September a mine about $\frac{1}{8}$ in. long is seen near the tip of the needle. Before the date at which the needle falls the larva cuts it at its base and carries this case to the bud to which it attaches itself. After hibernating, it feeds on the tender needles and pupates amongst them at the end of April or early in May.

Schuster (L.). **Der Distelfink als Vertilger der Lärchenminiermotte,** *Coleophora laricella,* **Hb.** [The Goldfinch as a Destroyer of the Larch Miner, *C. laricella*.]—*Allgem. Forst- u. Jagdzeitg.*, xcvi, 1920, p. 27. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liii, no. 4–12, 31st March 1921, p. 225.)

In April and May 1919 goldfinches were seen clearing the larvae of *Coleophora laricella*, Hb., from the extreme tips of the branches of larch trees.

Coaz (J.). **Ueber das Auftreten des grauen Lärchenwicklers** (*Steganoptycha pinicolana*, **Zell.**) **als Schädling in den Lärchenwaldungen im Kanton Graubünden, insbesondere des Oberengadins, und im Kanton Tessin in den Jahren 1911, 1912 und 1913, und Massnahmen zur Bekämpfung desselben.** [The Occurrence of *Enarmonia diniana* as a Pest of Larch Forests in the Canton of Grisons especially in the Upper Engadine, and in the Canton of Tessin in 1911, 1912 and 1913, and Combative Measures against it.]—*Schweiz. Zeitschr. Forstwesen*, lxviii, 1917, pp. 73–82, 123–131. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 4–12, 31st March 1921, p. 226.)

A period of 23 years elapsed between serious outbreaks of *Enarmonia diniana* (*Steganoptycha pinicolana*) in the Upper Engadine in 1886–1888 and 1911–1913, instead of the previous periods of 8, 13 and 6 years. In the 1911–1913 outbreak the injury to larch reached its maximum in June 1912, and the moths were most numerous on the wing in September of that year. In 1913 Hymenopterous parasites ended the outbreak. The best method for combating this pest consists in establishing mixed plantations of spruce and *Pinus cembra* throughout the Upper Engadine up to 5,900 ft., and even 7,600 ft. if the imported spruces, *Picea pungens*, *P. engelmanni* and *P. sitchensis* are grown. Nesting facilities should be provided for insectivorous birds.

Busse (—). **Die Eiben-Gallmücke** (*Cecidomyia taxi*). [The Yew Gall-Midge, *C. taxi*.]—*Mitt. Deutsch. dendrol. Ges.*, 1918, p. 287, 1 plate. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 4–12, 31st March 1921, p. 265.)

Annual infestations by a gall-midge, *Cecidomyia taxi*, prevent the formation of seeds in yews and the consequent spread of this tree.

Fulmek (L.) & Stift (A.). **Ueber im Jahre 1919 erschienene bemerkenswerte Mitteilungen auf dem Gebiete der tierischen und pflanzlichen Feinde der Kartoffelpflanze.** [Communications of Value published in 1919 concerning the Animal and Vegetable Enemies of the Potato.]—*Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 15–21, 10th May 1921, pp. 321–342.

A comprehensive review of the literature on the subject for 1919 is here given.

Enslin (E.). **Die Blattwespengattung** *Tenthredo*, **L.** (*Tenthredella*, **Rohwer**). [The Sawfly Genus, *Tenthredo*, L.]—*Abhandl. zool.-bot. Ges., Vienna*, xi, 1920, pp. 1–96. (Notice in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 15–21, 10th May 1921, p. 455.)

This is a monograph of the Palaearctic species of the sawflies of the genus *Tenthredo*, which includes several species of economic importance.

Danger (L.). **Die Graseule und deren Bekämpfung.** [The Antler Moth and Measures against it.]—*Landw. Wochenbl. f. Schleswig-Holst.*, lxvii, 1917, p. 591. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liii, no. 15–21, 10th May 1921, p. 467.)

The antler moth, *Charaeas graminis*, L., has done considerable damage in Mecklenburg-Strelitz. A number of birds destroy the

larvae, and of these, plovers are so useful that landowners have forbidden the collection of their eggs. The author advises rolling by night, the strewing of kainit or lime, or spraying with a solution of kainit.

SCHANDER (R.) & KRAUSE (F.). **Die Krankheiten und Schädlinge der Erbse.** [Diseases and Pests of the Pea.]—*Abteil. Pflanzenkrankh. d. Kais. Wilh.- Inst. f. Landw., Bromberg,* Flugbl. nos. 29 & 30, 1918. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liii, no. 22–24, 1st June 1921, pp. 603–604.)

Sitona lineata feeds on the edges of the leaves of peas; young plants must be sprayed with Urania green, or collection of the adult weevils with nets may be resorted to. Collection of the larvae is the only practical measure against *Polia* (*Mamestra*) *pisi.* Against Aphids, *Acyrthosiphon pisi* (*Siphonophora ulmariae*) and *Aphis rumicis* (*papaveris*), a spray containing 2 per cent. soft soap and 0·5 per cent. lysol is effective. Nematodes (*Tylenchus dipsaci* (*devastatrix*) and *Heterodera schachtii*), wireworms and Melolonthid larvae also infest peas. The pods and seeds are attacked by a gall-midge, *Contarinia pisi*; Coleoptera, *Apion vorax* and *Bruchus pisi*; and Lepidoptera, *Cydia* (*Grapholitha*) *dorsana* and *C. nebritana.* Early varieties suffer less from these moths

KRAUS (R.). **Zur Frage der Bekämpfung der Heuschrecken mittels des** *Coccobacillus acridiorum,* **d'Hérelle.** [The Control of Locusts by means of *Coccobacillus acridiorum.*]—*Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liv, no. 1–2, 30th June 1921, pp. 50–52.

The contents of this paper, which calls attention to the doubtful value of *Coccobacillus acridiorum,* are substantially the same as those of one already noticed [*R.A.E.*, A, ix, 600].

STRAŇÁK (F.), UZEL (J.), BAUDYŠ (E.) & others. **Zprávao chorobách a škůdcích rostlin Kulturních v Čechách za rok 1918.** [A Communication on the Diseases and Pests of Cultivated Plants in Bohemia in 1918.]—*Zemědelský Arch., Prague,* 1920, pp. 80–96, 195–202. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liv, no. 3–7, 12th July 1921, pp. 155–156.)

Stored flour was infested with the mites, *Tyroglyphus farinae* and *Cheyletus eruditus.* Observations in connection with beet Nematodes show that all specimens of seed-beet that show even the slightest sign of injury must be destroyed. The caterpillars of *Euxoa segetum* were destroyed either by means of a powder obtained from larvae killed by *Tarichium megaspermum* or—especially in sandy, porous soil—by watering with a 2 per cent. solution of potassium cyanide. An important parasite of these caterpillars is *Macrocentrus collaris,* Spin. The male moths are attracted by light; the females by baits, such as syrup, beet, and dried stone-fruit. *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) did much harm to pear trees, and in some cases other fruit trees and oaks were attacked.

Raspberry pests included *Lasioptera rubi* and a beetle, *Byturus fumatus.* Near Prague *Gracilaria syringella* is abundant. *Eulecanium* (*Lecanium*) *corni* occurs on *Robinia.*

WILLE (J.). **Chlorpikrin als Schädigungsbekampfungsmittel in seinen Wirkungen auf Tier und Pflanze.** [Chloropicrin as a Fumigant—its Effects on Animals and Plants.]—*Die Naturwissenschaften*, ix, 1921, pp. 41–48. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 3–7, 12th July 1921, pp. 170–171.)

The information given in this paper is substantially the same as in one already noticed [*R.A.E.*, A, ix, 252].

STIFT (A.). **Ueber im Jahre 1920 veröffentlichte bemerkenswerte Arbeiten und Mitteilungen auf dem Gebiete der tierischen und pflanzlichen Feinde der Zuckerrübe.** [Communications of Value published in 1920 concerning the Animal and Vegetable Enemies of the Sugar-beet.]—*Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 8–10, 4th August 1921, pp. 261–272.

A review of the literature on the subject for 1920 is given.

SCHAFFNIT (E.). **Beschädigungen des Getreides durch Drahtwürmer.** [Injuries to Grain by Wireworms.]—*Bericht Auftreten v. Feind. u. Krankh. d. Kulturpfl. in d. Rheinprov. 1918 u. 1919*, pp. 47–49. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, p. 338.)

Injury to cereals by wireworms (*Agriotes lineatus* and other species) is common in the Rhine province. Remedial measures include the use of such baits as sliced potatoes, and pieces of oil-cake, and manuring with ammonium sulphate and kainit. Heavy rolling, deep ploughing and the utilisation of poultry are also useful measures.

SCHAFFNIT (E.). **Getreidefliegen.** [Dipterous Pests of Grain.]—*Bericht Auftreten v. Feind. u. Krankh. d. Kulturpfl. in d. Rheinprov. 1918 u. 1919*, pp. 43–47. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, pp. 347–348.)

Of the grain pests in the Rhine province, the frit-fly, *Oscinella (Oscinis) frit*, L., principally attacks young winter and summer plants. Sowing should not be done before 1st October and 1st April. Crop rotation is important, as rye and wheat following clover are particularly badly attacked; lupin and root-crops should precede them. Manuring with potassium nitrate, deep ploughing, and trap-crops are other measures.

Chlorops taeniopus, Mg., causes malformations of the ears of wheat; winter wheat and winter rye are injured in the same way as by the frit-fly. This pest has two generations a year. Eggs laid in mid-May give rise to adults at the end of August, and those laid in September produce hibernating pupae. Measures against this pest are the same as for the frit-fly, with the addition of heavy manuring. If the infestation is severe, wheat should be replaced by oats; rye and barley are less suitable for this purpose.

Hylemyia coarctata, Fall., causes retarded development of wheat and rye in late winter; wheat is often entirely destroyed, rye seldom, while winter barley seems immune. Infestation is heavier on light,

dry soils and in high, sunny situations. The character of the preceding crop is all-important, the attack being slightest after root-crops, fodder or manure plants. Fallowing, especially clover fallowing, favours the pest. The best preventive measures are good cultural methods, manuring and repeated rolling. If the outbreak is very severe, the crop must be ploughed under to a depth precluding the emergence of the adults.

The Hessian fly, *Mayetiola destructor*, Say, causes damage very similar to that of the frit-fly, but as it is very sensitive to unfavourable weather it seldom occurs in large numbers, and rapidly disappears. The stubble must be deeply ploughed under against the summer generation, all straw and debris being burned. Severely attacked winter sowings must be ploughed under in spring.

Clinodiplosis equestris, Wagn., is more especially found in the Cologne district. The leaf-sheaths of wheat and barley swell and the growth of infested plants is retarded. The eggs are laid at the end of June on the upper leaves, and the larvae give rise to the swellings. At midsummer they migrate to the ground, where they hibernate and pupate. There is thus only one generation a year. Deep ploughing-in of the stubble, which prevents the adults from reaching the surface, is the measure advised.

HERING (M.). **Zur Biologie und systematischen Stellung von** *Scythris temperatella*, **Led.** [On the Biology and systematic Position of *S. temperatella*.]—*Deutsch. ent. Zeitschr. Iris, Dresden*, xxxii, 1919, pp. 122–129. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, p. 349.)

Scythris temperatella, Led., for which the author proposes the new generic name *Syringopais*, is a grain pest in Asia Minor. The egg and larva are described. The larva mines the leaves of barley, wheat, and probably other grasses. The infested leaves turn a straw-yellow colour. Pupation takes place on or in the ground in a firm, white cocoon, garnished with pieces of earth or grains of sand. A remarkable sex dimorphism is noticeable in the adults.

BAKÓ (G.). **A kukoriczamoly** (*Pyrausta nubilalis*) **életmódjának, kártételének és irtásának rövid vázlata az 1916 és 1917 évi megfigyelések és kiserléti kotatások alapján.** [A brief Account of the Life-history, Injury and Control of *P. nubilalis*, based on Observations and Experiments in 1916–1917.]—*Rovartani lapok*, xxiv, 1917, pp. 140–155. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no 11–19, 2nd September 1921, p. 372.)

This paper supplements a brief note already noticed [*R.A.E.*, A, vi, 407].

In Hungary *Pyrausta nubilalis* is on the wing in June. The eggs are laid in heaps of 20–35 on the upper surface of the maize leaf. The larva hibernates in the stalk from October to May. It then again becomes active, and subsequently pupates in the second half of May. The loss caused by this moth may amount to 70 per cent. of the crop. Stalks must be cut off close to the ground, otherwise many larvae may survive in the stubble. Maize straw stored until the following summer must be kept in dry barns, where the larvae perish for lack of moisture. Parasites of this pest that have been recently observed in Hungary are a common Hymenopteron and a rare Dipteron.

SCHAFFNIT (E.). **Die Stockkrankheit des Roggens und des Klees** (*Tylenchus dipsaci*, **Kühn** = *T. devastatrix*, **Kühn**). [The Nematode Disease of Rye and Clover (*T. dipsaci*).]—*Bericht Auftreten v. Feind. u. Krankh. d. Kulturpfl. in d. Rheinprov. 1918 u. 1919*, pp. 49–53. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, pp. 378–379.)

In various districts of the Rhine province cereals, especially winter rye, are considerably injured by a Nematode, *Tylenchus dipsaci*, Kühn. The infestation begins when two or three leaves are formed on the plant. After the harvest, in late summer and in autumn, the eelworms return to the ground, only a few remaining in the stalks. In dry ground they remain in a state of suspended animation until they are able to resume development. Under these conditions they die after about two and a half years. To combat them it is necessary to clear away all weeds, to arrange a suitable crop rotation, and to grow root-crops repeatedly, as these drive them to a greater depth, where there is more moisture. This has the effect of restoring animation and of causing their death from lack of food. Trap-crops are also useful, and the sowing of winter rye in mid-October is advised. Manuring must aim at developing the young plants quickly in the stages in which they are most likely to be injured. Saltpetre is good for this purpose, while stable manure should only be used for crops that are not suffering from infestation. In May 1915 and 1916 the author made experiments in soil disinfection with hydrocyanic acid, produced by placing sodium cyanide in the ground, and he obtained surprisingly good results.

POSTELT (A.). **Der Getreidelaufkäfer,** *Zabrus gibbus*. [The Corn Beetle, *Z. gibbus*.]—*Wiener landwirtsch. Ztg.*, lxviii, 1918, p. 87.

SIEGMUND (G.). **Das Auftreten des Getreidelaufkäfers in Mähren.** [The Occurrence of *Z. gibbus* in Moravia.]—*Ibidem*, p. 334.

SKUTECKY (G.). **Das Auftreten des Getreidelaufkäfers in Mähren.** [The Occurrence of *Z. gibbus* in Moravia.]—*Ibidem*, p. 387. (Abstracted in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, pp. 379–380.)

In the autumn of 1917 an outbreak of a beetle, *Zabrus gibbus*, occurred in Moravia. The only means of actually getting rid of this pest is a thorough change in crop rotation. The beetle was most abundant in one district, where rye is grown after barley; in higher localities, where the poorer soil cannot stand such exacting crop rotation, and rye follows clover or potatoes, no injury is done to winter crops. One of the authors (Skutecky) considers the accepted life-cycle of three years to be incorrect. Spraying with Paris green, chloride of lime, or arsenicals has been recommended.

JABLONOWSKI (J.). **Mi módon bántja a hassziai légy agabonanővénytn?** [How does the Hessian Fly attack Corn?]—*Rovartani lapok*, xxiv, 1917, pp. 1–4. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, p. 397.)

The oat midge, *Mayetiola avenae*, lays more than 20 eggs in autumn; the larvae soon hatch and crawl down the leaf to the leaf-sheaths, where they feed and rapidly harden, so that they cannot be suffocated by the growing plant. The Hessian fly [*Mayetiola destructor*] also travels downwards to the lowest joint in the stem that is enveloped by the leaf-sheath. At this point its presence so weakens the stem that it breaks in the slightest wind.

BLUNCK (H.). **Die niederen tierischen Feinde unserer Gespinstpflanzen.** [The lower Animal Enemies of our Textile Plants.]—*Ill. Landw. Zeitg.*, xl, 1920, pp. 259–260. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 11–19, 2nd September 1921, pp. 409–410.)

The pests common to both hemp and flax are a Nematode, *Tylenchus dipsaci*, Kühn (*devastatrix*); spinning mites, *Tetranychus* spp.; Lepidoptera, especially *Phytometra* (*Plusia*) *gamma*, L., and *Heliothis dipsacea*, L.; and Melolonthid larvae.

Pests peculiar to hemp include the hop aphis, *Phorodon* (*Myzus*) *humuli*, Schr.; the leaf-mining fly, *Agromyza strigata*, Mg.; the Pyralid, *Pyrausta nubilalis*, Hb.; the Noctuid, *Polia* (*Mamestra*) *persicariae*, L.; and the adults of the flea-beetle, *Psylliodes attenuata*, Koch.

Flax pests include a root Nematode, *Heterodera radicicola*, Greef; *Thrips linearius*, Uzel; various Tipulid larvae; a moth, *Phalonia epilinana*, Zell.; a flea-beetle, *Longitarsus parvulus*, Payk.; and wireworms.

FRIEDERICHS (K.). **Die angewandte Entomologie als selbständige Disziplin.** [Applied Entomology as an Independent Science.]—*Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 20–24, 7th October 1921, pp. 486–491.

This paper advances the claims of applied entomology to an independent position among the sciences in Germany, and quotes the opinions of Howard [*R.A.E.*, A, ix, 353] and Escherich [*R.A.E.*, A, ix, 257], with which full agreement is expressed.

FULMEK (L.) & STIFT (A.). **Ueber im Jahre 1920 erschienene bemerkenswerte Mitteilungen auf dem Gebiete der tierischen und pflanzlichen Feinde der Kartoffelpflanze.** [Communications of Value published in 1920 concerning the Animal and Vegetable Enemies of the Potato.]—*Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 20–24, 7th October 1921, pp. 492–529.

This paper reviews the literature on the subject for the year 1920.

STELLWAAG (F.). **Neue Wege zur Schädlingsbekämpfung.** [New Ways for promoting Work against Pests.]—Reprint from *Deutsch. Obstbauzeitg*, 1920, no. 11, 4 pp. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 20–24, 7th October 1921, pp. 550–551.)

The work of combating injurious insects in Germany is considered to be behind the times. Many legislative measures have been disregarded, and, to remedy this, instruction on popular lines should be given on the various pests. Scientific views should rule in all questions of control, and the authorities must be taught that even dangerous poisons are needful in combating insect pests. The insect pest division of the German Fruit-growers' Association must undertake instruction and propaganda work, arrange for supplies of insecticides, promote the production of resistant varieties of fruit-trees, etc., and act generally as a medium between research and practice.

STELLWAAG (F.). **Frühjahrsbekämpfung einiger wichtiger tierischer Schädlinge der Obstbäume und Beerensträucher.** [Spring Treatment against some important Animal Pests of Fruit Trees and Bushes.]—*Flugschr. d. staatl. Lehr- u. Versuchsanst. f. Wein- u. Obstbau in Neustadt a.d. H.*, 1921, 2 pp. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., liv, no. 20–24, 7th October 1921, p. 553.)

Aphids should be sprayed from below with nicotine. Against the larvae of *Nygmia phaeorrhoea* and *Malacosoma neustria* sprays of Zabulon or Urania green must be used; these sprays are also useful against those of *Cheimatobia brumata* when still on the trees. Urania green is effective against *Cydia pomonella*; spraying should be done, preferably from above, immediately the petals fall. The larvae of *Pteronus ribesii* should be sprayed with nicotine and soft soap, Zabulon or Urania green, but the last-named must not be used when the fruit is nearly ripe.

VIDAL (J. T.). **Los Parásitos de los Vegetales.** [The Enemies of Plants.]—*Gaceta Rural, Buenos Aires,* xiv, no. 167, June 1921, pp. 1291–1295. [Received 7th November 1921.]

It is probable that in future the work of combating diseases of plants will primarily consist in the production and cultivation of resistant varieties and in correct cultural procedure.

While these methods may be of great value against insect pests, it is probable that there will be a great development in the use of their natural enemies. Insecticides, so largely employed at present, are very costly, sometimes difficult to apply, and often merely palliative in effect. A number of cases are instanced in which insect pests have been controlled by means of natural enemies.

(i) **Georgia Law to Regulate the Registration, Branding, Inspection and Analyses of Insecticides and Fungicides.** (ii) **Insecticide and Fungicide Standards adopted by the Georgia State Board of Entomology.** (iii) **Ruling of the Commissioner of Agriculture on Tagging Packages of Insecticides and Fungicides.**—*Georgia State Bd. Ent., Atlanta,* Circ. 32, January 1921, 9 pp. [Received 7th November 1921.]

The texts of these Acts, adopted 22nd October and 17th and 21st November 1920, respectively, the provisions of which are indicated in the title, are given verbatim. The standards for various insecticides and fungicides adopted are as follows:—For calcium arsenate, not less than 40 per cent. arsenic pentoxide and not more than 0·75 per cent. water-soluble arsenic pentoxide; density not less than 80 or more than 100 cu. in. per lb. For lead arsenate paste, not less than 12·5 per cent. arsenic pentoxide, not more than 0·75 per cent. water-soluble arsenic pentoxide, and not more than 50 per cent. water. If extra water be added, the mixture must be labelled lead arsenate and water, the percentage of extra water being plainly and correctly stated on the label. For dry powdered lead arsenate, not less than 25 per cent. arsenic pentoxide and not more than 1·5 per cent. water-soluble arsenic pentoxide. For dust mixtures of sulphur or lead arsenate and lime or other filler, not less than 10 per cent. pure sulphur, or not less than 5 per cent. pure dry lead arsenate. Not less than 90 per cent. of the mixture must be fine enough to pass through a wire screen

of 200 meshes to the inch. For lime-sulphur, not less than 29 per cent. calcium polysulphide ; not less than 1 per cent. calcium thiosulphate ; inert ingredients not over 70 per cent. ; test not less than 28° Bé. For dry lime-sulphur, not less than 63 per cent. calcium polysulphide ; not less than 5 per cent. calcium thiosulphate ; not less than 12 per cent. sulphur ; inert ingredients not over 20 per cent. For atomic sulphur, not less than 45 per cent. sulphur ; inert ingredients, not over 55 per cent. The total percentages of active ingredients are to be shown on the label, and in any arsenical mixture the percentage of water-soluble arsenic pentoxide must be given.

Bee Disease Law of Georgia and Rules and Regulations adopted by the Georgia State Board of Entomology in accordance therewith.—*Georgia State Bd. Ent., Atlanta,* Circ. 33, January 1921, 8 pp. [Received 7th November 1921.]

The text is given of an Act adopted on 22nd October 1920 to prevent the introduction into, and dissemination within, the State of Georgia of contagious and infectious diseases of honey bees ; providing for the eradication of bee diseases, with regulations for carrying out the provisions of the Act ; and prescribing penalties for non-compliance.

LEWIS (A. C.) & CHASE (W. W.). **Control of Curculio and Brown Rot of Peaches.**—*Georgia State Bd. Ent., Atlanta,* Circ. 34, February 1921, 4 pp. [Received 7th November 1921.]

Heavy losses occurred to the Georgia peach industry in 1920, largely owing to lack of thoroughness in spraying and other remedial measures. A revised spray schedule is given, based upon experiments of the last ten years [*R.A.E.*, A, viii, 277], and further improvements on it may be expected. The two chief causes of loss are the attacks of the peach curculio [*Conotrachelus nenuphar*] and the brown rot that so frequently follows its punctures. To guard against these, the trees should be pruned after the leaves have fallen, so as to allow the entrance of sunshine and free circulation of air. They should then be thoroughly sprayed with lime-sulphur solution. As early in autumn as possible all rubbish about the orchards should be burnt, by 1st November if practicable. Frequent shallow cultivation should be practised under the trees during May, June and July, in order to destroy the pupae of *C. nenuphar*. During the summer the spray schedule should be followed. Immediately after the harvest of each variety, all fallen fruit and any left on the trees should be gathered and destroyed ; this should be done within a week, before the larvae in the fallen fruit enter the soil for pupation. This fruit should either be buried under 24 inches of soil or mixed and covered with quicklime and wetted, in order that the heat generated may kill the larvae.

WARREN (W. C.). **Cotton Dusting Experiments of 1920.**
WILLIAMS (I. W.). **Recommendations for Cotton Dusting for Coming Season.**—*Georgia State Bd. Ent., Atlanta,* Bull. 59, February 1921, 16 pp. [Received 7th November 1921.]

During 1920, experiments were undertaken to determine more accurately the value of calcium arsenate [*R.A.E.*, A, viii, 302] against the cotton boll weevil [*Anthonomus grandis*] under Georgia conditions. The results showed that this poison, properly applied, is a successful remedy. In heavy infestations the dust should be applied once or

twice just before the squares are large enough to be punctured. While they are being attacked, two or three dustings should be given at intervals of 3 or 4 days until the weevils are under control. The applications should then be discontinued until infestation begins again. From 5–7 lb. of dust should be used per acre each time. Considerably better results were obtained by dusting while the dew was on the plants. The calcium arsenate used should be of standard composition [*R. A. E.*, A, x, 19].

It was impossible in 1920 to estimate accurately the profits gained by dusting; it is considered that a gain of 100 lb. of seed cotton will pay the cost of poisoning, and the average gains were considerably above this. A limited number of tests were made to determine whether dusting would be profitable while the plants are very small and the weevils that have survived the winter are feeding on the buds, and these tests will be continued.

SANDERS (G. E.). **Spraying and Dusting.**—*57th Ann. Rept., Nova Scotia Fruit Growers' Assoc., Kingston,* 1921, pp. 66–92.

The main points of this address and discussion on spraying and dusting have already been noticed [*R. A. E.*, A, ix, 228, 319]. Suitable spray and dust calendars for the Nova Scotia apple orchards are given.

BRITTAIN (W. H.). **A New Alien Enemy.**—*57th Ann. Rept., Nova Scotia Fruit Growers' Assoc., Kingston,* 1921, pp. 142–148.

An account is given of *Psylla mali*, Schmidb. (apple-sucker), which has recently appeared in Nova Scotia, with suggestions for its control [*R. A. E.*, A, vii, 506; ix, 385]. In some of the most heavily infested orchards the insect has been almost entirely exterminated by a fungous disease; this, however, can only develop where the Psyllid is very numerous, and does not seem suitable for artificial distribution.

DUDLEY (F. H.). **Dusting the Orchard.**—*Qtrly. Bull., Maine Dept. Agric., Augusta,* xix, no. 3, September 1920, 31 pp., 6 figs. [Received 8th November 1921.]

The situation is discussed with regard to dusting in Maine orchards, where, on the whole, the practice is growing. Several fruit growers contribute their experiences with dust sprays, and a spray calendar is included.

Notes are given on *Pyrausta nubilalis* (European corn borer), *Papaipema nebris* (*nitela*) (common corn borer), *Heliothis obsoleta* (corn ear worm), and Elaterids (wireworms) with brief instructions for remedial measures.

KNAPP (A. W.). **Insect Pests in the Cocoa Store.**—*Bull. Imp. Inst., London,* xix, no. 2, 1921, pp. 189–200, 1 plate.

The insect pests likely to be found in stored cacao are *Ephestia cautella*, Wlk., *E. elutella*, Hb., *E. figulilella*, Gregs., *Araecerus fasciculatus*, DeG., *Ptinus tectus*, Boield., *P. fur*, L., and *Necrobia rufipes*, DeG. The methods of infestation and its possible prevention, as well as the destruction of adults and larvae in the store by means of cleanliness, ventilation, temperature, insecticides and fumigants, are outlined.

Pests of the Oil Palm in the Portuguese Congo.—*Bull. Imp. Inst., London*, xix, no. 2, 1921, pp. 205–207, 4 plates.

This information is compiled from notes received from R. Swainson-Hall.

The insect pests of the African oil palm (*Elaeis guineensis*) here mentioned are *Oryctes owariensis*, *O. monoceros* and *O. boas*. These beetles bore through the basal parts of the leaves into the tops of the growing-point of the palm and enter the heart of the unfolded leaves, or centre spike, working downwards. The youngest expanded leaves die off, and the leaves in the central bud generally unfold, showing triangular cuts on each side of the central rib. Eggs are laid in the soft growing-point. The larvae feed on the younger tissues and top part of the palm, the whole of the centre of the top being usually eaten away. The full development of *O. owariensis* requires about a year, but the generations are continuous, and all stages may be found together. Remedial measures have not yet been tried in the Congo, but the pest may possibly be controlled by the fungus *Metarrhizium anisopliae*, used against the rhinoceros beetle [*O. rhinoceros*] in Samoa [*R. A.E.*, A, vii, 424].

Bevan (W.). **Annual Report of the Director of Agriculture for the Year 1920-21.**—*Nicosia, Cyprus*, 1921, 19 pp.

On the 6th August 1920, *Platyedra* (*Gelechia*) *gossypiella* (pink cotton bollworm) was added to the schedule of diseases in regard to which special restrictions on the importation of cotton seed and other produce are imposed.

For several years apples and other fruits have been infested with ermine moth [*Hyponomeuta*], and although sprayers and insecticides have been provided at a low cost, the population has made little use of them, and the crops have in consequence greatly deteriorated. Remedial measures against *Cydia* (*Carpocapsa*) *pomonella* (codling moth) and the Chalcid, *Eurytoma amygdali*, infesting almonds, have been continued successfully. On potatoes *Phthorimaea operculella* (*Lita solanella*) was again less destructive than in 1915.

As a result of rewards offered for queen hornets during April and May 23,000 individuals were collected. Great damage is done by hornets to bees and nearly all kinds of spring and summer fruit.

The important discovery by Mr. Storey that *Aspidiotus hederae* is absent from the citrus plantations has been noticed elsewhere [*R. A. E.*, A, x, 1], and there is now no reason why these fruits should not be imported into Egypt.

Pests attacking olive trees are the olive moth [*Prays oleellus*], the olive leaf-miner, an unidentified species of *Aspidiotus*, *Zeuzera pyrina* (leopard moth), and the olive Psyllid [*Euphyllura olivina*]. With the exception of *Z. pyrina*, these pests are unknown in Egypt.

Lichtenstein (J. L.). **Sur la Biologie d'un Chalcidien.**—*C. R. Hebdom. Acad. Sci., Paris*, clxxiii, no. 17, 24th October 1921, pp. 733–735, 1 fig.

The Chalcid, *Habrocytus cionicida*, sp. n., is recorded as parasitising the weevil, *Cionus thapsi*, when the latter is in the cocoon. The egg is deposited on the larva, generally only one to each host. The eggs hatch in two or three days, and the larva feeds for about seven to eight days before pupating inside the host cocoon. The adults emerge in about a fortnight.

Ruby (J.). **La Lutte contre les Sauterelles dans les Bouches-du-Rhône.**—*Progrès Agric. & Vitic., Montpellier*, lxxvi, no. 45, 6th November 1921, pp. 441–446.

The extensive use of poison-baits against locusts [*Dociostaurus maroccanus*] which was planned for 1921 in the south of France [*R. A. E.*, A, ix, 233] has been very successful. The organisation of the Defence Syndicate of Bouches-du-Rhône and the manner of using the bait are described. The area treated consisted of more than 86,450 acres, of which some 28,405 are under cultivation and about 54,340 form valuable pastures. The net annual revenue from this land is estimated at £640,000 (at par), whereas the anti-locust campaign cost little over £12,000. By the end of June the situation was saved and the crops that had already suffered were recovering, while very few locusts were left to carry the infestation over to another year.

These results show that within a definitely circumscribed area prompt and co-ordinated action can deal successfully with invasions of gregarious locusts.

Anderson (T. J.). **Annual Report on the Division of Entomology for the Year ending 31st March 1918.**—*Brit. E. Africa Dept. Agric. Ann. Rept. 1917–1918, Nairobi*, 1921, pp. 37–98. [Received 10th November 1921.]

The most important pest of coffee in British East Africa is the Pentatomid, *Antestia lineaticollis*, Stål (coffee bug), of which a detailed account is given, with particulars of its parasites [*R. A. E.*, A, vii, 405; ix, 563].

A minor pest is *Anthores leuconotus*, Pasc. (white coffee borer), the eggs of which are laid on the bark, near the ground-level. The young larvae burrow under the bark and form tunnels, which sometimes extend to the branches, almost completely excavating the stem and leaving excrement and dust protruding from the holes. The larval stage probably lasts two years at least. The stem may be partly or completely ring-barked, and may become so hollow that it is easily broken by wind or other causes; the tap-roots may also be tunnelled and weakened. The larvae, when located, should be cut out with a sharp knife, as the stem is hard and thick, or a few drops of carbon bisulphide injected into the holes will kill them, the holes afterwards being plugged with clay.

The Bostrychid, *Apate monacha*, F. (black coffee borer) seems to be increasing in numbers in several plantations. As soon as the characteristic dust is noticed on the ground at the base of the stem, the bushes in the vicinity should be examined, and prompt remedial measures undertaken. The carbon-bisulphide remedy described above has given success. The food-plants of this beetle in East Africa are coffee, *Citrus* and *Grevillea*, the stems and branches of coffee often being so weakened that they break in the wind. Cutworms, caterpillars of *Parasa* sp., and thrips were all troublesome.

Among pests of *Citrus*, *Chrysomphalus aurantii*, Mask. (red scale), is by far the worst; the process of fumigation for this scale is described; others are *Icerya purchasi*, Mask., the citrus Psyllid [*Trioza*], caterpillars of *Papilio demodocus*, Esp., and *P. mackinnoni*, E. M. Sharpe, *Ceratitis capitata*, Wied., *Dacus* sp., *Aphis tavaresi*, Del G., and *Toxoptera aurantii*, Boyer.

Traps or artificial breeding-places for *Oryctes monoceros*, Ol. (coconut beetle), have been kept working regularly since 1913, and details are given of the results in various localities. Up to 31st March 1918, with a total of 350 traps, 5,259 dead palms have been destroyed, and eggs or individuals of *O. monoceros* in varying stages to a total of 209,345 have been captured. The cost is estimated at about 5s. per trap per annum.

An account is given of the cultivation of silk, an industry which it is hoped may be much improved, and the report of the Imperial Institute on eri silk from British East Africa is appended.

DOPWELL (H.). **Annual Report of the Foreman Plant Instructor on Coconut Beetle Trap Work and Native Coconut Cultivation for the Year ending 31st March 1918.**—*Brit. E. Africa Dept. Agric. Ann. Rept. 1917–1918, Nairobi,* 1921, pp. 99–104. [Received 10th November 1921.]

A detailed account is given of the working of traps for the coconut beetle [*Oryctes monoceros*] and of coconut cultivation by the natives [see preceding paper].

HOPKINS (A. D.). U.S. Bur. Ent. **Bioclimatic Zones determined by Meteorological Data.**—*Mthly. Weather Rev., Washington, D.C.,* xlix, no. 5, May 1921, pp. 299–300. [Received 11th November 1921.]

In the present paper the determination and characterisation of the bioclimatic zones is discussed [*cf. R.A.E.*, A, ix, 506]. Temperature is the most reliable guide to the preliminary interpretation of the distribution and range of the zones. The application of the thermal mean principle of identifying bioclimatic zones must be based on a table of sea-level constants for the sea-level isophanes of the continents of the northern and southern hemispheres, computed from the records at an intercontinental base. By means of this table, a preliminary preparation of which has been made with Parkersburg in West Virginia as the intercontinental base station, the zone represented by the geographical position of any meteorological station in the world may be indicated by comparing its recorded means with the corresponding thermal constants of the table. This is, however, only one of many methods of identifying the zone represented by a geographical position and is only intended to supplement the others. Its great value in making preliminary predictions, when no other method is available, is shown by the fact that the predictions based upon it for over a thousand stations in many cases agree as closely with the facts as those determined by any method short of a detailed survey

ALLEN (R. H.). **Report of the Division of Plant Pest Control.**—*Massachusetts Ann. Rept. Dept. Agric., Year ending 30th November 1920, Boston,* Publ. Doc. no. 123 [1921], pp. 71–79. [Received 8th November 1921.]

During the year the department has been chiefly concerned with the inspection of nurseries and nursery stock, and with the European corn-borer [*Pyrausta nubilalis*, Hb.]. As this moth was found to be present in a large number of new food-plants, the quarantine of the previous year, which prohibited the movement of maize, has been

amended to include celery, green beans in the pod, beets with tops, spinach, rhubarb, oat and rye straw as such or when used for packing, cut flowers or entire plants of *Chrysanthemum*, *Aster*, *Cosmos*, *Zinnia*, hollyhock, and cut flowers or entire plants of *Gladiolus* and *Dahlia*, except the bulbs thereof without stems; all these may, however, be moved out of the infested area if they have passed inspection.

There has been a marked decrease in the presence of San José scale [*Aspidiotus perniciosus*] in nurseries during the last few years. The oyster-shell scale [*Lepidosaphes ulmi*] was found to be more prevalent, especially on some of the more susceptible varieties of shrubs. As a result of careful inspections, the European pine shoot moth [*Rhyacionia buoliana*] has been practically eliminated from the nurseries.

An infestation of gipsy moth [*Porthetria dispar*] covering an area of over 100 square miles was discovered in New Jersey. The infested stock is supposed to have been imported from Holland several years previously.

Other miscellaneous insects recorded during the year were *Phalonia rutilana*, Hb. (juniper webworm), and *Dichomeris* (*Ypsolophus*) *marginella*, F., causing serious damage, especially to Swedish junipers; *Tetralopha* (*Benta*) *melanogrammos*, Zell., found particularly on red, Scotch and Mugho pine; and *Otiorrhynchus ovatus*, L. (strawberry crown girdler), injurious to arbor-vitae, this being apparently the first record of its attacking this tree.

HOLLAND (E. B.), BOURNE (A. I.) & ANDERSON (P. J.). **Insecticides and Fungicides for Farm and Orchard Crops in Massachusetts.**—*Mass. Agric. Expt. Sta., Amherst*, Bull. 201, March 1921, 37 pp. [Received 8th November 1921.]

The composition of the more useful and important insecticides and fungicides is explained, and the conditions under which the various materials and mixtures are effective are discussed. The form of guarantee under which many of the chief proprietary ingredients are sold is quoted, and a table shows the basic quantities of the chief arsenites and arsenates of standard or near standard composition that may be used. Mixtures of insecticides and fungicides that are safe and those that are dangerous are shown in a diagram.

A popular edition of this bulletin is also issued in a shortened form.

SCHULTZ (V. G. M.). **Neues über** *Agrotis chardinyi*, **B. (Lep.).** [New Information on *Euxoa chardinyi*.]—*Ent. Mitt., Berlin*, x, no. 6, 1st November 1921, pp. 175–181.

Very little was known regarding the early stages of *Euxoa* (*Agrotis*) *chardinyi* until lately, when Zöllner described all stages (*Iris*, xxxiv, p. 62). The present paper aims at completing that work, and in correcting it in some particulars. The larvae feed on many plants, including *Sonchus arvensis*, *S. oleraceus*, *S. asper*, lettuce, peas, dandelion, *Rumex* and *Symphoricarpus*.

ZETEK (J.). **La Hormiga Arriera en Panamá.** [The Leaf-cutting Ant in Panama.]—Reprints from *Rev. La Salle, Panama*, July–August 1920, 8 pp., 2 figs. [Received 8th November 1921.]

Leaf-cutting ants are a serious pest in Panama. The most common species is *Atta cephalotes*, and descriptions, taken from existing

literature, are given of its habits and of the appropriate measures against it. Those advised are the use of repellents, such as nicotine sulphate or mercury bichloride, the poisoning of the fungus, *Rozites gongylophora*, cultivated in the nests, the collection and destruction of the females, and fumigation of the nests.

ZETEK (J.). **La Oruga de los Pastos.** [The Grass Caterpillar.]—Reprint from *Rev. La Salle, Panama*, September 1920, 6 pp., 1 fig. [Received 8th November 1921.]

The southern grass-worm, *Laphygma frugiperda*, S. & A., does much damage to pastures and crops in Panama. The caterpillars must be noted when they first appear, as it is very difficult to deal with them when they are mature. Spraying with the arsenates of lead, lime or zinc, or the use of a poison-bran bait, may be resorted to. Rolling is also a valuable measure on pasture land. Trap-trenches account for large numbers, and the pupae may be destroyed by ploughing.

ZETEK (J.). **La Mosca Prieta en Panamá.** [The Black Fly in Panama.]—Reprint from *Rev. La Salle, Panama*, December 1920, 6 pp., 1 fig. [Received 8th November 1921.]

This article reviews existing knowledge on the citrus black fly, *Aleurocanthus woglumi*, Ashby, which occurs throughout Panama as the result of the absence of any quarantine to prevent its introduction. After referring to the recent United States quarantine against this Aleurodid, it is suggested that the Canal Zone should adopt the United States plant quarantines and that the Republic of Panama should empower the Canal Zone to extend them to products in transit for Panama through the ports of Cristobal Colon, Balboa and Panama. Meanwhile Panama could establish a less comprehensive quarantine system against products from Costa Rica and Colombia.

ZETEK (J.). **La Cuarentena de los EE. UU. contra la Mosca Prieta.** [The United States Quarantine against the Black Fly.]—*Rev. La Salle, Panama*, [v, no. 56] May 1921, pp. 205–208. [Received 8th November 1921.]

This is an account of the recently established United States quarantine against *Aleurocanthus woglumi*, Ashby [*R.A.E.*, A, ix, 357].

ZETEK (J.). **El Comején.** [The Termite.]—*Rev. La Salle, Panama*, [v, nos. 57–58] June–July 1921, pp. 237–239, 268–271. [Received 8th November 1921.]

Termites are among the worst insect pests in Panama. This article deals with their habits and describes the measures usually employed against them. Prevention is preferable to remedial methods, and the importance of termite-proof houses and clean cultivation are emphasised.

RAMÍREZ (R.). **La Cochinilla de la Caña de Azucar.** [The Sugar-cane Scale.]—*Rev. Agric., San Jacinto, Mexico,* vi, no. 5, September 1921, p. 307, 1 fig.

This is a brief note on a Coccid, *Llaveia sacchari*, infesting sugar-cane in Mexico. At the beginning of an infestation it is easily checked by spraying with petroleum, gasoline, or calcium polysulphides. Badly infested canes should be burned.

ZACHER (F.). **Schädlinge der Nutzpflanzen im West-Sudan.** [The Pests of Economic Plants in the Western Sudan.]—*Der Tropenpflanzer, Berlin,* xxiv, nos. 7–8 and 9–10, July–August and September–October 1921, pp. 97–108, 132–142.

The Senegal and Upper Niger regions are of ever-increasing importance as sources of raw materials, especially oil and fibres, and this paper deals with the known insect pests as well as those that may be expected there.

Sorghum and *Pennisetum* are of great importance as food. According to A. and J. Vuillet, Aphids may be serious pests of these crops. The method of encouraging the natural enemies of *Aphis sorghi*, Theo., and of *A. maidis*, Fitch, which is of less importance, as well as of *Siphonophora leptadeniae*, a species harmless to *Sorghum*, by planting *Leptadenia lancifolia*, is described [*cf. R.A.E.*, A, ii, 396, 630]. If the infestation is very severe, *Pennisetum spicatum* should be grown for a time. Well-shaded ground should not be planted with *Sorghum*. In Togo, Busse has recorded *Aphis sorghella*, Schout., on *Sorghum*, but this species is said to be identical with *A. sorghi*, Theo.

Pennisetum spicatum seems to suffer little from insects, and the only pest recorded from the French Sudan is a weevil, *Siderodactylus sagittarius*, Ol., feeding on the leaves.

Harvested grain is damaged by insects, especially *Calandra oryzae*, L., though *Sorghum* suffers less risk owing to the small size of the grain.

The ground-nut is the chief cultivated plant, and crops in the Senegal region have been reduced by insect attack, especially in dry weather. The pests concerned have already been dealt with at length by Roubaud [*R.A.E.*, A, v, 338].

The earth-pea, *Voandzeia subterranea*, is injured by *Bruchus vicinus*, var. *subinnotatus*, Pic, from three to five individuals occurring in one seed.

Cotton has more enemies than the ground-nut in the region of the Upper Niger. Nearly all the more important cotton pests found in Togo occur here. Most of them have already been dealt with [*R.A.E.*, A, ii, 1].

Tobacco is largely grown in some districts, and though losses from insect pests have not been published, it is certain that many of the African tobacco pests [*R.A.E.*, A, viii, 424] occur.

On the Guinea coast coffee and cacao are infested by the beetles, *Mallodon downesi*, Hope, *Monochamus* (*Monohammus*) *ruspator*, F., *Ancylonotus tribulus*, F., *Coptops aedificator*, F., *Baraeus sordidus*, Ol., *B. marmoratus*, F., and *Sternotomis chrysopras*, Voet, while *Incsida obscura*, F., is a dangerous pest of *Castilloa*. The kola nut pest, *Balanogastris colae*, Desbr., also occurs in Senegal.

Acacia trees are of great economic importance, the most valuable species being *Acacia verek*, which produces most of the gum arabic exported from the French Sudan. The wood of this and other species is attacked by the Bostrychids, *Xylopertha picea*, Ol. (which also

infests *Hevea brasiliensis* and *Quercus mirbecki*), *Sinoxylon ceratoniae*, L., *S. senegalensis*, Karsch, and *Apate terebrans*, Pall. Other wood-boring beetles are *Acmaeodera polita*, Mg., *Macrotoma boehmi*, Reitt., and *Xystrocera globosa*, Ol. A list is given of the Lepidopterous pests of *Acacia* in Egypt. The Coccid, *Ceroplastes africanus* var. *senegalensis*, March., attacks *Acacia arabica* and *A. tortilis* in Senegal. *Pseudococcus filamentosus*, Ckll., has been noticed, but only on *Ximenia americana*; its spread to other plants is, however, only a question of time.

The doum palm (*Hyphaene*) and borassus palm yield vegetable ivory, wine, and plaiting material. *Oryctes boas*, F., *Rhynchophorus phoenicis*, F., and *Sphenophorus terebrans*, Ol., destroy *Phoenix canariensis* and are probably capable of injuring other palms.

Butyrospermum parkii (butter tree), which is important on account of the high fat content of its fruits, is defoliated by the Saturniid, *Cirina butyrospermi*, the eggs of which are parasitised by *Anastatus vuilleti*, Crawf. A bug, common in the Ethiopian region, *Afrius purpureus*, Westw., attacks the young caterpillars. Another caterpillar, *Bostra* sp., also injures the leaves. A small moth, *Mussidia nigrivenella*, Rag., lives in the fruits, while the leaves are attacked by Lepidopterous, Dipterous and Hymenopterous leaf-miners.

Sesamum is attacked by a Coccinellid, *Epilachna chrysomelina*, F., and the caterpillar of *Heliothis* (*Chloridea*) *obsoleta*. A beetle, *Lagria viridipennis*, feeds on the foliage of yams, cow-peas and cotton.

Locusts may become of very great importance, *Schistocerca gregaria*, Forsk. (*peregrina*, Ol.) being the principal species concerned. Chameleons eat large numbers of these. It is not yet certain whether *Cyrtacanthacris* (*Acridium*) *angulifera*, Krauss, *C.* (*A.*) *cavroisii*, Finot, and *C.* (*A.*) *citrina*, Ol., are of economic importance on the Senegal River. Other Orthoptera known to be injurious include *Zonocerus variegatus*, L., and *Brachytrypes membranaceus*, Dru.

KOMÁREK (J.). **Kalamita Mnišková a Polyedrická Nemoc.** [The Polyhedral Disease of Nun-Moth Caterpillars.]—*Časopis československé Společnosti Entomologické, Prague*, xviii, no. 1–2, 1921, pp. 6–10. [With a Summary in English.]

In 1920 the author was able to study a polyhedral disease of the nun-moth [*Liparis monacha*] during a severe outbreak that destroyed many forests in Czecho-Slovakia.

Tachinids, the only insect parasites of any importance, killed only 50 per cent. of the caterpillars or pupae. Other insects and birds are valueless, and polyhedral disease appears to be the only available controlling agent. Investigations as to the cause of the disease led to the discovery of many minute bodies, which seem to be the same as the Chlamydozoa described by Prowazek in cases of grasserie. Even in very acute infections the tissue of the intestines remains healthy, so that the organism apparently attacks the caterpillars by way of the air and is first localised in the tracheae and skin. This is of practical importance, as food is thereby ruled out as a carrier. According to the author's observations, infectious diseases end a nun-moth outbreak only after three or four years, this interval being necessary for the infection to spread sufficiently.

If success attends attempts to cultivate these organisms, it is intended to distribute them in the first year of an outbreak so as to produce rapidly the conditions that prevail at the end of one.

KARNY (H.). **Die neuen australischen Thysanopteren der Mjöberg-Ausbeute. (Vorläufige Mitteilung.)** [The New Australian Thysanoptera from the Mjöberg Collection. (Preliminary Communication.)]—*Časopis československé Společnosti Entomologické, Prague*, xvii, no. 1–4, 1920, pp. 36–44.

Of the Thysanoptera collected by Mjöberg in Australia only seven species were already known; twenty-nine new species and one new variety are here described. The following new genera are erected:—*Ophthalmothrips, Aspidothrips, Pygmaeothrips, Empresmothrips, Bagnalliella, Acrothrips* and *Titanothrips*. Keys are given to the species of *Horistothrips* and *Adiaphorothrips*.

MYERS (J. G.). **Insect Pests of Lucerne and Clover.**—*N.Z. Jl. Agric., Wellington*, xxiii, no. 3, 20th September 1921, pp. 156–162, 13 figs.

The most noticeable pest of lucerne and red clover in New Zealand is *Heliothis (Chloridea) obsoleta*, the caterpillars of which appear in great numbers in March and attack the flower heads of red clover. *Nysius huttoni* is the commonest insect in the fields, and has attacked lucerne in abnormal numbers. This bug is indigenous, and also occurs on numerous wild plants. *Rhopalimorpha obscura* (one-striped plant bug) sucks the unripe seeds of grasses, and the nymphs and adults have been found on lucerne and red clover in considerable numbers. *Zizera labradus* is very common. This butterfly has been recorded as a serious pest in Australia, and may become so in New Zealand. *Phytometra (Plusia) chalcites* (maize looper caterpillar) is less common.

Anuraphis (Aphis) bakeri (clover aphis) and *Bruchophagus funebris* (clover seed Chalcid) have not previously been recorded in New Zealand, but are both common in America. Their life-histories have already been noticed [*R.A.E.*, A, vi, 139, 399]. The Syrphids, *Micromus tasmaniae, Melanostoma fasciatum, Syrphus novae-zealandiae*, and an unidentified Hymenopteron are natural enemies of *A. bakeri* in New Zealand. *B. funebris* was abundant on red clover about to be cut for seed, lucerne being attacked to a less degree. This Chalcid affects the quantity of the seed crop, and is maintained by the sowing of infested seed. No natural enemies of it have been recorded in New Zealand.

OSBORN (H. T.). **A Dust Insecticide against Leafhoppers.**—*Hawaiian Planters' Record, Honolulu*, xxv, no. 4, October 1921, pp. 167–170.

In view of the success of nicotine sulphate in dust form against the walnut aphis [*Chromaphis juglandicola*] and other pests, experiments were undertaken in July 1921 with a nicotine dust spray against the sugar-cane leafhopper [*Perkinsiella saccharicida*]. The formula used contained not less than 5·9 per cent. nicotine sulphate, 44 per cent. inert carrier and 50 per cent. sulphur dust; this was applied by a hand duster. The spray used for comparison was 1 pt. nicotine sulphate to 1,000 pts. water, with about 2 lb. whale oil soap to every 50 U.S. gals. water, an ordinary knapsack sprayer being used. From the results

obtained it appears that dusting is rather more effective than spraying, but it was not possible to estimate accurately the relative expense of the two methods.

A small number of predacious spiders were collected in material from the sprayed and dusted plots, but generally they appeared to be resistant. In only one case were the leafhopper egg parasites found in numbers. On one dusted plot 80 *Ootetrastichus beatus*, 50 *O. formosanus* and 270 Mymarid parasites were found, and on the same plot about a week later 90 *O. beatus*, 26 *O. formosanus* and 100 Mymarids.

During 1921 the infestation has been light, and observations show that heavier infestations occur in fields of 6–12 months' growth, where the difficulties of artificial control are increased.

SMITH (L. B.). **Breeding Mosaic Resistant Spinach and Notes on Malnutrition.**—*Virginia Truck Expt. Sta., Norfolk,* Bulls. 31 and 32, April–July 1920, pp. 137–160, 5 figs., 5 tables. [Received 11th November 1921.]

The chief agents in the transmission of the mosaic disease of spinach are *Macrosiphum solanifolii* (pink and green aphis) and *Myzus persicae* (green peach or spinach aphis). Parthenogenetic generations of these species occur throughout the year and may cause severe loss to crops. They can be controlled by spraying on spinach that is harvested before 1st December, but this is not practicable in the case of late crops. At present no other remedial measures are known. Experiments prove that the Manchurian spinach is distasteful to these Aphids, and that they are less abundant on the hybrid stock than on the commercial strains of Savoy spinach.

SMITH (L. B.) & ZIMMERLEY (H. H.). **Relation of Pressure to Effectiveness in Spraying Tomatoes.**—*Virginia Truck Expt. Sta., Norfolk,* Bulls. 33 and 34, October 1920–January 1921, pp. 163–190, 10 figs., 8 tables. [Received 11th November 1921.]

For many years the authors have endeavoured to devise a practical spraying scheme for the control of insect and fungus pests of tomatos, which are one of the chief crops in Virginia. One of the most serious pests is *Heliothis* (*Chloridea*) *obsoleta*, Hbn. The adult moths emerge in early May and deposit eggs on the plants which are in full bloom between 15th May and 1st June. The larvae begin to feed when the earliest fruit is set, eating through the skin into the pulp. These punctures also permit the entrance of fungi.

The spraying experiments undertaken in 1919 and 1920 on the early crops are detailed. In 1919 the average percentage of infestation on plots sprayed with lead arsenate and Bordeaux mixture at pressures of 200, 140 and 75 lb. was 16·25 per cent., 16·51 per cent. and 16·81 per cent. respectively, while on unsprayed plots it was 25·23 per cent. In 1920 spraying at pressures of 200, 140 and 75 lb. showed infestation of 11·70 per cent., 14·24 per cent. and 15·12 per cent. respectively, unsprayed plots showing 21·39 per cent.

COOLEY (R. A.). **Department of Entomology.**—*27th Ann. Rept. (1919–20) Montana Agric. Expt. Sta., Bozeman,* February 1921, pp. 27–29. [Received 12th November 1921.]

One of the chief pests in Montana is the pale western cutworm [*Porosagrotis orthogonia*], which caused over £600,000 worth of damage

in 1920. Investigations prove that the adults prefer freshly worked or soft soil for oviposition. Other cutworms also occur, and the sugar-beet webworm [*Loxostege sticticalis*] is abundant and often mistaken for *P. orthogonia.*

Camnula pellucida (yellow-winged locust) was unusually abundant in 1920. The substitution of amyl acetate for lemons [*R.A.E.*, A, ix, 585] was most effective, and a further improvement is the mixing of the poison and salt with the wet ingredients instead of the dry bran.

Tortrix (*Archips*) *argyrospila* (fruit-tree leaf-roller) has caused over £50,000 worth of damage to apple trees in the Bitter Root Valley. As the use of miscible oils in early spring did not control the outbreak, further experiments were made after oviposition in the summer.

RANE (F. W.). **16th Annual Report of the Massachusetts State Forester for 1919.**—*Boston*, Publ. Doc. no. 73, 1920. 61 pp., 5 plates. [Received 12th November 1921.]

Remedial work against the gipsy moth [*Porthetria dispar*] has continued throughout the year on the usual lines. The author is convinced that, before long, spraying and creosoting the egg-clusters in alternate years will be the method adopted, lead arsenate being undoubtedly the best spray for the purpose. Co-operation with those interested in the cranberry industry, for the purpose of clearing the cranberry bogs of gipsy moths, has again been found of great benefit.

SMITH (G. A.). **Report of the Superintendent of Gipsy-moth Work.** —*Ann. Rept. Mass. Commiss. Conserv. and State Forester for Year ending 30th November 1920, Boston*, Publ. Doc. no. 73, 1921, pp. 53–60. [Received 12th November 1921.]

In spite of the usual measures against the gipsy moth [*Porthetria dispar*] and the brown-tail moth [*Nygmia phaeorrhoea*], the former was slightly more prevalent during 1920, though the resulting defoliation was less, the frequent rains possibly checking the feeding of the larvae. Both wilt disease and parasites failed to contribute to the usual extent in reducing the numbers of the pest. The brown-tail fungous disease, which has hitherto been an effectual check on *N. phaeorrhoea*, was found in only one colony. Greater co-operation of property owners against this pest is desirable. The reports from cranberry growers regarding the results of gipsy moth work are very encouraging. A brief statement of the more important activities of the Federal work against the gipsy moth is contributed by Mr. A. F. Burgess, who gives some details of the scouting and quarantine work and of the colonisation of insect enemies of *P. dispar. Anastatus bifasciatus*, which attacks the eggs, was considerably reduced in numbers, though apparently more abundant and more widely distributed than *Schedius kuvanae*, which does not survive extremely cold weather. *Apanteles melanoscelis* was more abundant than ever before, and heavy parasitism of the caterpillars was noticed. *Compsilura concinnata* and *Blepharipa scutellata* have destroyed many of the larvae. *Calosoma* [*sycophanta*] was also numerous in many localities

A brief account is given of *Stilpnotia salicis* (satin moth) in the State [*R.A.E.*, A, ix, 574].

Report of the Division of Forestry.—*Ann. Rept. Mass. Commiss. Conserv. and State Forester for Year ending 30th November 1920, Boston,* Publ. Doc. no. 73, 1921, pp. 30–44. [Received 12th November 1921.]

A study is being made of the white pine weevil [*Pissodes strobi*] in relation to forest management. This weevil is widely prevalent, but little is known regarding the damage it causes, the effect on its distribution of the composition of the forest and other natural factors, or any silvicultural measures to check its depredations. It is essential to determine to what extent plans for planting and treating forests should be modified to minimise the destruction caused.

Parker (T.) & Long (A. W.). **A Laboratory Note on the Control of** *Trogoderma khapra.*—*Bur. Bio-Technology, Leeds,* Bull 4, 1st October 1921, pp. 102–104. [Received 14th November 1921.]

Trogoderma khapra is gradually spreading and can only be exterminated from malthouses by repeated fumigation. To ascertain the most satisfactory fumigant, carbon-tetrachloride, trichlorethylene, tetrachlorethane, pentachlorethane and chloropicrin have been tested.

Chloropicrin is most effective for killing the larvae, but its effect on malt has not yet been determined. Pentachlorethane kills free larvae in the bins, but not the insects in the interior of the grain. To test its effect on the malt it was used at the rate of 1 pint to 1,000 cubic ft., with an exposure of 1,000 minutes. The odour and taste of the compound were clearly apparent, but easily removed by drying in the kiln, during which process the malt is repeatedly turned. Any remaining traces are dispelled when the wort is boiled in the open coppers, and no deleterious effect is produced upon the ultimate taste of fermented liquors.

[**Notes on Insect Pests.**]—*Bur. Bio-Technology, Leeds,* Bull. 4, 1st October 1921, pp. 108–113.

With reference to recent records of *Trogoderma khapra,* Arr., and other insects infesting breweries in England [*R.A.E.*, A, ix, 431], a meal beetle, found in the screenings of foreign barley, has now been identified as *Tenebrio molitor,* L. This beetle was taken in the larval stage; pupation occurred about the second week in July, and an adult emerged on 15th August. Enquiries indicate that this pest is fairly common, perhaps more so in malt-culms than among the malt. *Silvanus surinamensis* (saw-toothed grain beetle) has also been found in large numbers in maltings in Essex.

The Ptinid, *Niptus hololeucus,* has recently been observed in all stages in a sample of commercial casein. Before pupating, the larvae bind the casein granules together to form small cells, which, in casein of a granular quality, easily pass unnoticed. Casein so infested has a disagreeable odour and is unfit for consumption.

Entomological Notes.—*Agric. Bull. F.M.S., Kuala Lumpur,* ix, no. 1, January–March 1921, p. 3. [Received 15th November 1921.]

Insect pests investigated during the first quarter of 1921 include *Tiracola plagista,* Wlk., the caterpillars of which devour the leaves of castor oil plants, *Margaronia marginata,* Hmps., rolling the leaves of cinchona, and the caterpillars of the Noctuid moth, *Prodenia litura,* F., which feed on a variety of plants.

SOUTH (F. W.). **The Possibilities of developing Roselle Fibre as a Cottage or other Industry in the F.M.S.**—*Agric. Bull. F.M.S., Kuala Lumpur,* ix, no. 1, January–March 1921, pp. 23–26. [Received 15th November 1921.]

In discussing the possibilities of developing this industry, it is remarked that the seed pods of roselle [*Hibiscus sabdariffa*] are attacked to some extent by the cotton-stainer, *Dysdercus* sp., which has caused a small loss of seed. By analogy with what has occurred on cotton in the West Indies, it seems probable that if the plant were grown on a large scale, the pest would develop to such an extent as to reduce materially the yield of seed.

S[OUTH] (F. W.). **Report of the Work of the Inspection Staff, January, February and March, 1921.**—*Agric. Bull. F.M.S., Kuala Lumpur,* ix, no. 1, January–March 1921, pp. 29–33. [Received 15th November 1921.]

The situation in the campaign against coconut beetles is discussed. There was an outbreak of *Brachartona catoxantha* on old coconut palms in one locality; in another, the caterpillars of the skipper butterfly, *Hidari irava,* did some damage, but were finally controlled by insect parasites and a fungus.

SCHULTZ (E. S.). **A Transmissible Mosaic Disease of Chinese Cabbage, Mustard, and Turnip.**—*Jl. Agric. Res., Washington, D.C.,* xxii, no. 3, 15th October 1921, pp. 173–177, 4 plates.

During some recent experiments Chinese cabbage (*Brassica pekinensis*), mustard (*B. japonica*), and turnip (*B. rapa*) were found to be attacked by a mosaic disease similar to that found in Solanaceae. The disease is transmissible by direct transfer of juice and by Aphids. During the infestation here described, *Myzus persicae*, Sulz., was found on infected plants and was used in the transmission experiments.

WATIÈRES. (G. F.). **L'Olivier.**—*Rev. Agric. Afr. Nord, Algiers,* xix, no. 114, 7th October 1921, pp. 752–755.

Olive trees in Algiers are attacked by *Zeuzeura pyrina*, the larvae of which appear at the end of autumn. Towards February or March they are about 3–4 mm. long, and have just begun to tunnel into the bark; they can then easily be destroyed before any damage is done to the tree. *Saissetia* (*Lecanium*) *oleae* frequently attacks sickly trees, especially those with thick, bushy branches; most of the natives have not yet realised the indirect advantage, due to *Scutellista cyanea* [a Chalcid parasite of fig scales], to be obtained by the interposition of fig-trees in the olive groves. The Pyralid, *Margarodes unionalis*, chiefly attacks young trees and grafts, seriously arresting development. As these are always trees without much leaf surface, nicotine sprays are recommended as being as efficacious and not so dangerous as lead arsenate. *Dacus oleae* (olive fly) does serious damage; arsenical sprays are used against this pest.

Desjardins (—). **L'Oseille.** [Sorrel.]—*Rev. Agric. Afr. Nord, Algiers*, xix, no. 114, 7th October 1921, pp. 757–758.

Next to spinach, sorrel is considered the most important of the vegetables cultivated for its leaves and is very largely grown in Algiers. It is frequently attacked by *Aphis rumicis* (black aphis), for which 10 per cent. nicotine sprays or solutions of soft soap should be used.

Barge (J.). **La Lutte contre les Ennemis des Arbres fruitiers.**—*Rev. Agric. Afr. Nord, Algiers*, xix, no. 115, 14th October 1921, pp. 773–774.

One of the most troublesome pests of gardens and orchards in Algiers is *Cheimatobia brumata* (winter moth), which attacks a variety of trees, the young larvae infesting them in the spring when the young buds are developing. To stop the ascent of the wingless females, a band of liquid clay should be applied to the trunks of the trees, about a yard from the ground; above this should be tied a paper band covered with a sticky substance, which should be renewed every ten days. In the spring many eggs will be found below the sticky band, and the larvae can be destroyed by a soft soap solution. Against woolly aphis [*Eriosoma lanigerum*] the infested branches should be washed in November with a paraffin emulsion, or sprayed with a copper-sulphur spray.

Vincens (F.). **Rapport sommaire sur les Travaux effectués au Laboratoire de Phytopathologie de l'Institut Scientifique de l'Indochine du 1er janvier 1919 au 1er juillet 1921.**—*Bull. Agric., Inst. Scientif. Saigon*, iii, no. 10, October 1921, pp. 307–323.

This is an extract of the author's summarised report of his work, which was not confined to fungus pests, as the injury due to insects was too important to be neglected.

These included such pests of rice as the borers, *Chilo suppressalis*, Wlk., and *Chilo* sp., biological data on which have been published [*R.A.E.*, A, viii, 451; ix, 509]. Three Hymenopterous parasites of the former moth have been sent for identification. Recently a case was noticed in which about forty per cent. of the eggs of a species of *Chilo* were parasitised by *Ceraphron* (?). *Schoenobius incertellus*, Wlk., is more widespread in Cochin-China than *Chilo*, but is rarely so numerous as materially to decrease the crop. While *Chilo* may reduce it to ten per cent. of the normal, that figure represents, except in a very few instances, the maximum loss from *S. incertellus*. Some Hymenopterous parasites of the eggs and larvae of the latter have been obtained, but they seem unimportant. *Gnaphalocrocis medinalis*, Gn., does little harm; it seems to be checked to some considerable extent by parasitic Hymenoptera, which, however, are attacked by hyperparasites. Coleopterous pests also occur, including some Coccinellid larvae (*Epilachna* or an allied genus); they probably invade the rice fields when their usual food becomes scarce. This also seems to be the case with a small Chrysomelid, *Hispa aenescens*, or an allied species. A blue species of *Geocoryse*, very common in Cochin-China, sometimes descends in swarms on young rice plants, which turn yellow and die in a few days. Some observations made in 1919 show that certain Dipterous larvae injure the submerged portions of rice stalks; the eggs of this

fly are parasitised by the same Hymenoptera that attack *Schoenobius*. *Calandra oryzae* and *Sitotroga cerealella* were noticed on several occasions.

Several stem-borers (*Diatraea* and *Chilo*) and an injurious red scale occurred on sugar-cane, and *Oryctes rhinoceros*, *Rhynchophorus* and a Psychid that sometimes causes severe injury [*R. A. E.*, A, ix, 509] on coconuts.

At the end of April 1921 an infestation of cotton bolls with *Platyedra* (*Depressaria*) *gossypiella*, Saund., was observed [*cf. R. A. E.*, A, ix, 509]. *Sylepta derogata*, F., was abundant on cotton plants left in the field; a Tachinid and two Hymenopterous parasites have been bred from this Pyralid. A weevil, *Anthonomus* sp., abounds in the flowers and attacks the bolls; an enquiry has been sent to the United States to ascertain if the species concerned is *A. grandis*. A bug, *Dysdercus angulatus*, F., and a small moth are also minor pests of cotton.

Entomological research is very necessary in Cochin-China, the study of rice pests alone requiring many years' work on the part of an expert.

Lafrance (L.). **Insectes nuisibles des Forêts. V. Le Scolyte du Pin.** (*Ips pini*, **Say, Rhynchophora, Fam. Ipidae.**)—*Nat. Canad., Quebec*, xlviii, no. 4, October 1921, pp. 73–78.

The Scolytid, *Ips pini*, which has long been a pest of pines in America, but which chiefly confined its attacks to dead or dying trees, has gradually changed its habits and now attacks healthy ones, particularly if there are no sickly trees in the vicinity. The life-history and habits of this beetle are described [*R. A. E.*, A, vii, 429]. There are one or two generations in a year; dry, warm seasons are favourable to its development. Sickly or dying trees should be cut down in order to keep a pine stand healthy and reduce the numbers of the beetle.

Roth (F.). **Raupen der Kohleule und deren Vertilgung.** [The Caterpillars of the Cabbage Moth and their Destruction.]—*Schweiz. Obst- u. Gartenbauzeitung*, xxii, 1920, p. 313. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 84–85.)

Measures against the larvae of the cabbage moth [*Barathra brassicae*] include digging them out of the ground within a radius of 4–6 in. of the infested plants, the interplanting of lettuce as a trap-crop, covering the stems of valuable seedlings with paper, and strewing Paris green mixed with ten times its bulk of bran and a little molasses.

Conzen (M.). **Versuche zur Bekämpfung schädlicher Erdflohkäfer mit Uraniagrün.** [Experiments with Urania Green against Injurious Flea-beetles.]—*Deutsche Gartenbauzeitung*, xxii, 1920, p. 70. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 84–85.)

Repeated applications of a spray of Urania green mixed with lime and an adhesive proved excellent against flea-beetles infesting cabbage and rape. The spray must be kept well stirred.

RAMBOUSEK (F.). **Prognose der Rübenschädlinge.** [A Prognosis of Beet Pests.]—*Berichte Versuchsstation Zuckerind. in Prag*, no. 346. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 84–85.)

In Bohemia most beet pests, except *Silpha, Atomaria, Julus* and wireworms, first appear towards the end of June, so that attempts should be made to eliminate them before growing beet. Baits should be used to ascertain their presence. After clover and fodder crops there are always many beet pests; the ploughing under of clover involves many dying roots in the ground, which provide food for the pests that attack beet later. In 1921 many Enchytraeid worms occurred after corn and clover. These do not increase if the beets are sound, but if Melolonthid larvae and wireworms are present, they multiply and complete the destruction of the beet. *Heterodera schachtii* is gradually disappearing, as it is now unusual for one beet crop to follow another. *Atomaria linearis* was common in 1921.

NILSON-EHLE (H.). **Ueber Resistenz gegen** *Heterodera schachtii* **bei gewissen Gerstensorten.** [The Resistance of some Varieties of Barley to *H. schachtii*.]—*Hereditas*, i, 1920, pp. 1–34. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 84–85.)

Contrary to what obtains with other cereals, different varieties of barley show a varying degree of resistance to infestation by *Heterodera schachtii*, and the choice of resistant varieties is therefore a matter of great economic value in districts where this Nematode abounds in the soil.

LINDINGER (—). **Ein neuer Weg der Schädlingsforschung.** [A New Road in Research on Pests.]—*Naturwiss. Wochenschr.*, 1921, p. 255. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 84–85.)

This is a criticism of the work of existing plant protection institutes in Germany. A complete survey of the pests in the country should be undertaken, and the results compared.

FRIEDERICHS (K.). **Die neueren Untersuchungen über Rapsglanzkäfer.** [Recent Investigations on the Rape Beetle.]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvi, nos. 9–10, 11–12, 15th August and 15th November 1921, pp. 195–198, 236–238.

Papers on the rape beetle, *Meligethes aeneus*, L., published since 1917, and nearly all of German origin, are briefly noticed. Most of these have been already dealt with [*R. A.E.*, A, vi, 37, 93, 343, etc.].

HARUKAWA (C.). **Controlling the Rice-borer** (*Chilo simplex*) **by Submergence.**—*Ber. Ōhara Inst. Landw. Forsch., Kurashiki, Okayama*, i, no. 5, 1920, pp. 599–628, 1 graph. [Received 18th November 1921.]

The damage done in Japan by the rice-borer, *Chilo simplex*, is very serious, and a method of control that is both effective and convenient in application has long been sought for. The idea of control by submergence is not new, as Otsuka stated in 1895 that this method would not be effective. Since then several experiments in flooding have been made with highly conflicting results. Though not yet satisfied with his own results, the author publishes them here, as he thinks that some of the more important points are now explained.

There is some doubt as to whether, when the rice-stalks are submerged, the water penetrates the stalk and comes in contact with the rice-borer larva. As there must be a scarcity of oxygen after a sufficiently long submergence, the resistance of *C. simplex* to the lack of this gas was tested, carbon dioxide being the medium employed as it seems to have no marked poisonous effect on insects. Resistance to it was found to be fairly strong when the medium was at approximately normal temperatures, but an increase of temperature decreases the resistance.

As the temperature of water must, therefore, have a great influence on the efficacy of submergence in rice fields, the effect of high temperature was tested, the larvae being confined in closed vials, assumed to contain sufficient air for the duration of the tests, and placed in hot water of a certain temperature. The borer larvae did not die after exposure to about 95° F. (35° C.) for 24 hours regardless of their age, but about 108° F. (42·4° C.), 27·7 per cent. of the second instar larvae died in 6 hours. When the fourth and fifth instar larvae were exposed to about 104° F. (40° C.) for 24 hours it was found that only 4·4 per cent. died. Five minutes exposure to 122° F. (50° C.) killed all the larvae of every stage. From these and other results given it is apparent that a temperature higher than about 93°–95° F. (34°–35° C.) is injurious, though this temperature can be endured for a long time.

By preventing water from flowing into and out of a rice field in hot summer the temperature of the water rises markedly above that of the atmosphere. The death of the borer by flooding may therefore be expected to be due to the combined action of suffocation and abnormal temperature. Further experiments with vials filled with hot water prior to submersion show that the temperature of the water in a rice field plays a very important part. At a constant temperature of about 86° F. (30° C.) 28 hours' immersion will kill 100 per cent. The time decreases with the rise of temperature, being 14 hours at 95° F. (35° C.), 5 hours at 104° F. (40° C.) and 1 hour at 113° F. (45° C.). At temperatures over 104° F. the abnormal heat of the water becomes the predominant factor, the effect of suffocation being subsidiary.

It is, therefore, probable that a satisfactory result cannot be expected in rice fields with a submergence of 24 hours or less unless the maximum temperature reaches 93°–95° F. (34°–35° C.). In practice the author is inclined to think that under favourable conditions and good management about 50 per cent. of the borers can be killed, and a better result may be possible.

Tests with a film of kerosene when submergence was in progress seemed so unpromising that they were discontinued.

Ion (O.). **Пузыреногие (Thysanoptera) Петроградской Губ.** [Thysanoptera of the Petrograd District.] **Faunae Petropolitanae Catalogus, T. ii, no. 1.—Петроградский Агрономический Институт. Научно-Исследовательский Отдел. Энтомологическая Станция.** [*Petrograd Agron. Inst., Sci.-Res. Dept., Ent. Sta.*], *Petrograd*, Ser. C, no. 1, 1921, pp. 3–16. [Received 19th November 1921.]

This paper forms part of a series dealing with the fauna of the Petrograd district. In all 37 species of Thysanoptera are dealt with, 18 of which are recorded for the first time from Russia.

Shtackelberg (A.). **О Полезных Насекомых.** [About useful Insects.]—**Петроградская Станция Защиты Растений от Вредителей.** [*Petrograd Sta. for Protect. Plants from Pests*], *Petrograd*, 1921, 8 pp., 6 figs. [Received 19th November 1921.]

A brief popular account is given of the more common beneficial insects predacious or parasitic on the insect pests of agriculture in Russia.

Olchovsky (V. V.). **Материалы по Вредителямъ Клещевины** (*Ricinus communis minor*) **въ Бакинской Губерніи. По Наблюденіямъ 1916 Года.** [Observations made in 1916 on the Pests of the Castor Oil Plant in the Baku District.]—**Бакинско - Дагестанское Земское Бюро Борьбы съ Вредителями Сельскаго Хозяйства.** [*Baku- Dagestan Provincial Bureau for combating Pests of Agriculture*], *Baku*, 1917, 8 pp. [Received November 1921.]

Owing to the increased demand for castor oil and the lack of foreign supply resulting from the war, several planters began cultivating *Ricinus communis minor* in the Baku district. It was thought that this plant would be very little affected by the existing pests. A tour of inspection conducted in 1916, however, showed the crop to be attacked by *Heliothis obsoleta* (*armigera*), *H. peltigera* and *Phycita poteriella*, Z. The various stages of the latter moth are described; it is apparently one of the most serious pests, as the larvae reduce the crop by destroying the fruit. Wherever the castor oil plants were grown in the vicinity of cotton plantations, the latter were practically free from the attacks of *H. obsoleta* and *H. peltigera*, the former apparently acting as trap-crops.

Corrêia (A. P. P.). **Macrolepidottero nocivo al Riso nella Colonia di Goa (India portoghese).** [A Macrolepidopteron injurious to Rice in the Portuguese Colony of Goa.]—*Bol. Agric., Nova Goa*, ii, no. 1–4, 1920, pp. 16–19. (Abstract in *L'Agric. Colon., Florence*, xv, no. 11, 1st November 1921, pp. 545–546.)

Various measures have been tried against the larvae of *Prodenia litura* and other pests that occur in rice-fields in Goa. The best results were given by a film of petroleum emulsion spread on the water. This killed the larvae that fell when a bamboo was drawn along the tops of the rice-stalks. Other means that have been, or will be, tried are poison-baits, capture in a bag drawn along the infested plants, spraying with lead arsenate, and deep ploughing with a view to exposing the pupae to the sun and to natural enemies. As the larvae migrate *en masse*, it is possible to check infestation by completely clearing a belt from 15 to 24 feet in width across the line of march; they starve to death in crossing this bare area. A trench serves the same purpose.

Simmonds (H. W.). **Notes on** *Levuana iridescens*, **Beth. Baker.**—*Agric. Circ., Fiji Dept. Agric., Suva*, ii, no. 4, July–September 1921, pp. 84–85.

The author has endeavoured to trace the history of *Levuana iridescens*, B. B., in Fiji, and considers that it was probably introduced between 1860–77, when many native labourers were brought to the country from the Solomons, New Hebrides and Rotuma.

A local outbreak of this moth occurred in July 1921. When a number of eggs were placed on young coconut trees from Tahiti, the larvae disappeared a few days after hatching, being destroyed probably by jumping spiders. Other enemies are the bugs, *Tectocoris lineola* and *Canthecona cyanocantha*, and birds.

CARMENT (A. G.). **Fungoid Disease of** *Levuana iridescens*.—*Agric. Circ., Fiji Dept. Agric., Suva*, ii, no. 4, July–September 1921, pp. 85–86.

This paper records experiments on *Levuana iridescens* with certain fungi obtained from dead larvae and pupae. In those infested with a Malayan fungus [*R. A.E.*, A, ix, 502], no disease occurred amongst the larvae, while a Fiji fungus produced unhealthy, moist conditions in the pupae. The fungus lies dormant in the hard body of the dead larva or pupa until warm and moist conditions occur, when it grows rapidly. This disease may account for the disappearance of the various outbreaks of the pest each year. Spraying experiments are being carried out with an emulsion of the fungus.

SIMMONDS (H. W.). **Report on Bud-rot in Taviuni.**—*Agric. Circ., Fiji Dept. Agric., Suva*, ii, no. 4, July–September 1921, pp. 91–93.

In the course of an inspection of bud-rot at Taviuni, coconut trees were found infested with the Hispid, *Promecotheca reichei*, a leaf-eating moth, *Aganoxena argaula*, a weevil, *Diocalandra (Calandra) taitensis*, and a spathe borer. The damage caused was only slight, except in one locality, where the first two were more abundant.

SRINIVASA RAO (H.). **My Experiences of the Cocoanut Beetle.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore*, i, no. 4, October 1919, pp. 1–6. [Received 23rd November 1921.]

Oryctes rhinoceros is the chief obstacle in raising coconut plantations in Mysore. The attacks of this beetle are usually heaviest in the hot season. They are at their worst from the end of March till the end of June, when there is a very slight decrease up to the middle of October, after which they diminish appreciably, reaching their minimum in the middle of the cold weather.

In young palms the beetles attack the tender tissue below the surface. In older ones they infest the central shoot and the fleshy portion of the base of the midrib of the leaves. The various remedial measures that have been recommended for this pest are discussed.

SUBRAMANIA IYER (T. V.). **The Castor Semi-looper. A Serious Pest of the Castor Crop in Mysore.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore*, ii, no. 3, July 1920, pp. 123–126. [Received 23rd November 1921.]

The castor semi-looper [*Achaea janata*] is widely distributed throughout India as a pest of castor plants. This plant is sown in Mysore after the rains in June and July, when the pest appears and continues till the end of September. The larvae eat the leaves, leaving only the ribs on old plants and the main stalk on young plants. The top shoots and tender stems are eaten on very young plants.

The eggs are deposited singly on the lower surface of the leaves at night. One female can lay 400 eggs. The larvae hatch in 2–4 days,

and feed on the leaves for 15–21 days, after which they descend to the ground to pupate, amongst dry weeds and leaves underneath the plants. Pupation also occurs in dark and shady places between the folds of leaves on the plants and between fruit pods. The adults emerge in 10–14 days.

The natural enemies of this pest include Hymenopterous and Dipterous parasites, as well as birds, such as crows and mynahs. The remedial measures recommended are hand-picking and destruction of the larvae as they hatch. Clean cultivation is essential. Castor should not be grown as a mixed crop, and any stray plants must be destroyed, as they serve as breeding-places.

SUBRAMANIA IYER (T. V.). **Notes on the more important Insect Pests of Crops in the Mysore State.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore*, iii, nos. 1 and 2, March and June 1921, pp. 12–19 and 81–85, 5 figs. [Received 23rd November 1921.]

Some account is given of the more important Coleopterous pests of crops in Mysore. Potatoes and vegetables are seriously damaged by two species of *Epilachna*. The eggs are laid in clusters on the food-plant, and the larvae and adults feed on the foliage. These Coccinellids breed throughout the year, feeding on weeds when no cultivated crops are available. The remedial measures recommended are hand-picking and destruction of the beetles in the early stages of attack. Potatoes and other plants in which they breed out of season should be destroyed. *Mylabris* (*Zonabris*) *pustulata* occurs largely in September on the flowers of *Rosa sinensis*, *Hibiscus esculentus* and nearly all Cucurbitaceous plants. Vegetable flowers and a paddy crop were damaged in September by *Epicauta hirticornis*. These beetles should be collected in hand-nets.

Pests of coconut and date palms include *Oryctes rhinoceros*, L. (rhinoceros beetle), which also attacks the growing shoots of American aloes, and *Rhynchophorus ferrugineus*, F. (palm weevil).

The Chrysomelid, *Sagra nigrita*, breeds in large numbers on the main stems of climbing beans. In Bangalore the adults are found from June to September. The eggs are laid in the stems, and the larvae form large galls in the stem two and a half months later. Pupation occurs in these, the adults emerging four to five months afterwards. The total life-cycle occupies about one year. The galls should be split when they are forming and the larvae destroyed.

An occasional serious pest of ragi, potato and vegetable crops is *Gonocephalum hoffmannseggi* [*R. A. E.*, A, viii, 64].

Xylotrechus quadripes (coffee borer) is a serious pest of coffee, especially at low altitudes. Old plants survive attacks for a few seasons, but young plants die in a year or two. The remedial measures recommended for this Longicorn have already been noticed [*R. A. E.*, A, vi, 74; vii, 288].

Citrus is attacked by two Longicorn beetles, *Chelidonium cinctum* and *Chloridolum alcmene*, though the latter is rare. They are found in the adult state from April to June, when oviposition occurs. The larvae bore into the twigs and branches of the trees. Large stems can withstand attacks for a few seasons, but young twigs wilt in two or three months. The measures recommended are pruning off and burning small twigs containing larvae.

A serious pest of grape vines and mulberries is another Longicorn, *Sthenias grisator*, the adults of which are found in January and

February. The main stem of the vine is ringed, but only a few mulberry plants per acre are affected [*cf. R.A.E.*, A, viii, 100]. *Trachys bicolor* is widely distributed as a pest of *Butea frondosa* [*R.A.E.*, A, viii, 514].

Young sugar-cane in sandy soil was considerably damaged from July to September 1920 by larvae of a sugar-cane root grub. In October 1915 a Dynastid was found damaging the roots of paddy. The adults were able to remain under water for some time. An occasional serious pest of grape vines is *Scelodonta strigicollis*, Mots., a Eumolpid beetle which feeds on the leaves and scrapes the surface of immature canes and shoots in patches. It does not occur on vines trained in the local way, but was a serious pest in a vineyard trained in the European manner. It was controlled by collecting the adult beetles by means of a box 3 ft. square with the inside tarred.

FERRIS (G. F.). **Some Coccidae from Eastern Asia.**—*Bull. Ent. Res., London*, xii, pt. 3, November 1921, pp. 211–220, 7 figs.

The new species described are *Pinnaspis simplex* and *Fiorinia chinensis*, on undetermined food-plants from China; *Lepidosaphes tubulorum*, on *Sapium sebiferum* and *Salix warburgi* in Formosa, and on *Ilex crenata*, willow and currant in Japan; and *Pygalataspis miscanthi*, gen. et sp. n., on a grass, *Miscanthus sinensis*, in Formosa.

The opportunity is taken to rectify certain errors in the identification of a few species from Japan. The collections examined indicate that the Coccid fauna of Formosa is more closely related to that of Southern Asia than to that of Japan.

MORRIS (H. M.). **The Larval and Pupal Stages of the Bibionidae.** —*Bull. Ent. Res., London*, xii, pt. 3, November 1921, pp. 221–232, 17 figs.

Several species of Bibionids occur in large numbers in the spring and early summer in Britain, and their larvae are at times reported to have damaged various crops. The life-history of *Bibio johannis*, L., has previously been dealt with [*R. A. E.*, A, vi, 118]. The present paper gives an account of *B. marci*, L., *B. lacteipennis*, Zett., and *B. venosus*, Mg. Very few parasites of Bibionids are known. In addition to those mentioned by other authors, a Gregarine (probably *Schneideria mucronata*, Leger, recorded by Keilin) was found in a larva of *Dilophus febrilis*, while another, probably the *Glugea* also mentioned by Keilin, was taken from a larva of *B. johannis*. A Phorid, *Hypocera incrassata*, Mg., emerged from a mature larva of *B. marci*, only a single parasite being observed in each individual attacked.

MOKRZECKI (S. A.). *Agrilus foveicollis*, **Mars., as a Cause of the Decay of the Culture of Roses in Bulgaria.**—*Bull. Ent. Res., London*, xii, pt. 3, November 1921, pp. 353–354, 1 fig.

The damage done by *Agrilus foveicollis*, Mars., to rose trees in Bulgaria, especially *Rosa damascena*, Mill., which is extensively grown for making attar of roses, is described, and the known facts about

its life-history are recorded [*R.A.E.*, A, ix, 496]. The galls, which are the immediate cause of the death of the trees, are produced by the larvae, and generally appear on the stems, reaching two or three centimetres in length and sometimes twice the thickness of the normal stem; they contain the larval burrows. The swelling does not begin to form until the second year of injury, and in the third year the whole stem gradually dies.

LLOYD (LL.). **Notes on a Colour Tropism of** *Asterochiton* (*Aleurodes*) *vaporariorum*, **Westwood.**—*Bull. Ent. Res., London*, xii, pt. 3, November 1921, pp. 355–359, 5 figs.

An investigation into the habits of *Asterochiton* (*Aleurodes*) *vaporariorum*, Westw., with a view to controlling its attacks on tomatos under glass, is described. A study of its colour tropisms, here described in detail, leads to the conclusion that both sexes are attracted to yellow objects. Enormous numbers of these white-flies can be caught on a yellow screen by shaking infested plants near it. This method is not worth elaboration, however, as perfect control can be obtained in greenhouses by fumigations with hydrocyanic acid, and out of doors the insect does very little damage in England and can rarely be considered a pest.

VOGEL (I. H.). **The Cabbage Seed Stalk Weevil** (*Ceuthorrhynchus quadridens*, **Panzer**). **An important Pest of Cabbage Seed Plants on Long Island.**—*Canad. Ent., Guelph*, liii, no. 8, August 1921, pp. 169–171. [Received 22nd November 1921.]

As a result of injury to cabbages by *Ceuthorrhynchus quadridens*, Panz., the seed produced by the infested plants shows a reduction in quality, and in quantity this amounts to about 40 lb. per acre on Long Island. Oviposition occurs from about 16th to 26th May. The eggs hatch in about four days, and the larvae enter the midrib by the egg puncture. Their work extends down the pith of the branches and main stalk. After about ten days they bore a hole through the stalk, and drop to the ground ready for pupation. This occurs near the surface of the soil, and occupies about ten days. Adults were noticed from 16th June to 10th July. Hibernation probably occurs in this stage.

MORRISON (H.). U.S. Bur. Ent. **Some Nondiaspine Coccidae from the Malay Peninsula, with Descriptions of apparently New Species.** —*Philippine Jl. Sci., Manila*, xviii, no. 6, June 1921, pp. 637–677, 1 plate, 13 figs. [Received 22nd November 1921.]

The new species described are: *Anomalococcus multipori*, on stems of *Nephelium lappaceum* beneath ant cartons and on leaves of *Oncosperma horrida*; *Pseudococcus hispidus*, on *Gordonia*; *Alecanium hirsutum*, on *Alsodeia echinocarpa* attended by ants; *Coccus tumuliferus*, *C. penangensis*, *C. caviramicolus*, *C. macarangae* and *C. circularis*, in hollow stems of *Macaranga* spp.; *Platylecanium asymmetricum*, on the lower surface of leaves of *Penanga*; *Paralecanium ovatum*, on *Pandanus*; and *P. vacuum*, on *Ficus*.

Keys are given to the species of *Coccus* and *Platylecanium*.

HADLEY (C. H.). **The Status of the Work against the Japanese Beetle.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 249–253. [Received 22nd November 1921.]

During the past two seasons the plans suggested in a previous paper on the Japanese beetle, *Popillia japonica*, Newm. [*R.A.E.*, A, viii, 307, 374], have been closely followed. The work has now been reorganised on an experimental basis. The importation, breeding and dissemination of parasites, as well as quarantine measures to delay and hinder the spread of the pest, are included. The beetle has spread to such an extent through artificial agencies that further barrier-band work is considered impracticable.

SWEZEY (O. H.). **Some recent Insect Immigrants in the Hawaiian Islands.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 254–258. [Received 22nd November 1921.]

This list of insect immigrants noticed in 1919 and 1920 is arranged under the orders and comprises 9 Hymenoptera, 6 Diptera, 6 Coleoptera, 3 Homoptera, 1 Orthopteron and 1 Neuropteron. Notes are given as to the distribution, habits and importance of these. They include the Tahiti coconut weevil, *Diocalandra* (*Calandra*) *taitensis*.

LARRIMER (W. H.). U.S. Bur. Ent. **Grasshopper and Cricket Repellents.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 259–263. [Received 22nd November 1921.]

For several years farmers in widely separated localities in North America have had trouble as a result of grasshoppers and crickets cutting the bands of the sheaves of corn in the field, and previous records of this are quoted. Experiments have been recently undertaken to ascertain a suitable repellent mixture to prevent this damage. Small quantities of wheat bran were mixed with a variety of substances, of which copper sulphate and kerosene gave by far the most promising results as repellents. Soap was distinctly attractive, and was afterwards shown to improve both the attractiveness and mechanical condition of poison mash. *Melanoplus femur-rubrum* was by far the most numerous of the grasshoppers present in this experiment.

HEADLEE (T. J.). **The Response of the Bean Weevil to Different Percentages of Atmospheric Moisture.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no 3, June 1921, pp. 264–268. [Received 22nd November 1921.]

In the experiments described, which are supplementary to those previously recorded [*R.A.E.*, A, v, 205], on the response of *Bruchus obtectus* to varying degrees of atmospheric moisture ranging from less than 1 per cent. to approximately 100 per cent., use was made of the varying amount of moisture given off by saturated aqueous solutions of various salts, lithium chloride giving 7·1 per cent. atmospheric moisture, calcium chloride 25·9 per cent., sodium hydroxide 30·7 per cent., aluminium chloride 37 per cent., copper nitrate 45·7 per cent., sodium bromide 56·1 per cent., sodium chloride 73·4 per cent., sodium nitrate 80 per cent., and potassium sulphate 89·7 per cent. The air as it came from the concentrated sulphuric acid drier contained less than 1 per cent. of atmospheric moisture, and that passed through distilled water contained approximately

100 per cent. The results indicate that the optimum atmospheric moisture for the bean Bruchid lies somewhere between 80 and 89 per cent., and is located in the percentage that is just far enough below 89 to prevent the development of injurious fungi.

HORSFALL (J. L.) & EYER (J. R.). **Preliminary Notes on Control of Millipedes under Sash.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 269–272. [Received 22nd November 1921.]

Great damage is caused by millipedes to tomato seedlings, carrots and lettuce grown under frames in Pennsylvania. The application of sodium cyanide at the rate of 150 lb. to the acre resulted in an increase of 256 plants as compared with the untreated plots, each plot occupying 48 square feet. The cyanide was sprinkled in furrows and covered over. Sodium cyanide used at the rate of 250 lb. to the acre on ground cultivated before sowing did not prevent germination, but retarded it, whereas on ground cultivated the day before sowing no injury was caused. Nicotine sulphate, 1 part in 200 of water, sprinkled on a newly seeded bed resulted in an increase of 224 plants; 2 per cent. nicotine sulphate as a dust increased the stand by 144 plants. A bran mash consisting of 2 pk. [sic] bran, ½–1 pt. molasses (depending on quality), 2 oz. sodium arsenite, and sufficient water to make a mash, proved effective when scattered over the surface of the ground between the tomato plants and adjacent to the sides of the frames in the spring. The same poison bait applied in the autumn to protect lettuce plants proved ineffective, probably as a result of the seasonal habits of the millipedes.

WADLEY (F. M.). U.S. Bur. Ent. **Life History of the Variegated Cutworm.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 272–277. [Received 22nd November 1921.]

The Noctuid, *Lycophotia margaritosa*, Haw. (variegated cutworm) is distributed over most of North America as well as the rest of the world. In Kansas there are apparently three generations a year, though the third may be only partial. The moths have been observed at all seasons, but they occur in exceptional abundance about 10th July, 15th August and 1st November. The average time required for one generation in summer, in southern Kansas, is about 59 days. The eggs are usually laid in irregular compact masses, containing from 30 to 320 eggs, with an average of 130. A female may apparently deposit more than one egg-mass. The eggs hatch in from 4 to 6 days; the larvae grow faster, are more active and feed more greedily than most cutworms. They are apparently leaf-feeders and may climb plants to feed, but in some cases they burrow for food such as potato tubers. In the insectary, lucerne, several common vegetables and weeds were greedily eaten, with special partiality for pigweed, cabbage and turnip leaves. The larval stage lasts from 20 to 28 days. Pupation occurs in the soil at a depth of about 2 in., and lasts from 13 to 20 days. The life of the adult lasts from 8 to 13 days.

Only the first generation is, as a rule, injurious, the larvae being active in late May and in June. The later generations are hardly noticeable, probably owing to the action of parasites. In Kansas in 1915, and in Iowa in 1919, this moth was heavily parasitised by a Tachinid, *Archytas analis*. In southern Kansas the adult is apparently the principal if not the only hibernating stage of *L. margaritosa*.

RESSLER (I. L.). **Life History of *Pyrausta ainsliei*, Heinr., at Ames, Iowa, during the Season of 1920.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 277–280, 1 fig. [Received 22nd November 1921.]

There are two broods a year of *Pyrausta ainsliei* in Iowa. The hibernating larvae become active for a short while in the spring and enter the pupal stage in late May and early June, the adults emerging 10 to 14 days later. The eggs are deposited on the lower surface of the leaves of smartweed, in masses containing from 11 to 50. Dissections indicate that each individual lays several hundred. In the field, egg-masses were observed from the 10th June to 10th July. The larvae hatch in 6 to 10 days, and feed almost immediately at the midrib, but soon migrate to the stem, which they enter by a circular opening made almost invariably just above the node. Pupation occurred towards the end of July and August, and lasted from 9 to 14 days. The adults were seen from 10th August to 4th September. The larvae of this generation hatched about the 8th September and fed until the cool weather. Hibernation takes place in the burrows in the food-plant, the opening being sealed with excrement. *P. ainsliei* will not attack maize unless there is a scarcity of its natural food-plant, the smartweed (*Polygonum hydropiper*).

During 1920 about 50 per cent. of the larvae were parasitised by a Braconid, *Aleiodes* sp.

Should *P. nubilalis*, Hb., be introduced into Iowa, its life-history would be similar to that of *P. ainsliei*.

FORD (A. L.). U.S. Bur. Ent. **The Effect of Poison Bran Mash on Grasshoppers and the Lapse of Time between Poisoning and Death.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 281–285. [Received 22nd November 1921.]

Many farmers object to the use of poison bran mash for grasshoppers, as they consider that between the time of poisoning and death the grasshoppers have time to destroy the crop. The experiments here described were carried out on adults of *Melanoplus femur-rubrum* in Indiana during the summer and autumn of 1919, and show that although the action of the poison is not instantaneous the poisoned individuals consume less bulk than the unpoisoned ones. The bran mash was mixed with Paris green, white arsenic and crude arsenic, and detailed results of each experiment are given Individuals feeding on Paris green lived for an average of 35·5 hours after poisoning; those receiving white arsenic, for 43·9 hours, and those poisoned with crude arsenic lived for an average of 50 hours. Although the grasshoppers appear healthy and active for many hours after poisoning, they consume less than one-ninth as much as unpoisoned individuals.

It apparently takes very little poisoned bran mash to kill the grasshoppers, and those receiving smaller amounts die just as soon and eat just as little after poisoning as those consuming larger quantities.

FORD (A. L.) & LARRIMER (W. H.). U.S. Bur. Ent. **Observations on the Attractiveness of Materials used in Grasshopper Baits.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 285–291. [Received 22nd November 1921.]

During the summer of 1919 a serious outbreak of *Melanoplus femur-rubrum* in Indiana afforded an excellent opportunity for a series of

experiments to ascertain the relative value of various flavours, syrups, etc., in attracting grasshoppers. Sixteen flavours were used in twenty-six different combinations, the results of which are tabulated. Black strap molasses proved by far the most attractive, apple and black strap molasses next, and then wet bran. Two quarts of molasses added to every 25 lb. of bran increased its attractiveness by 28 per cent. In every case the combinations without salt attracted a greater number of individuals, the total being 23 per cent. more. The addition of syrups, with the exception of black strap molasses, did not increase the attractiveness of the wet bran. Experiments show that in every case sawdust and wheat bran mixed in equal parts attracted more grasshoppers than sawdust alone, the increase being about 36·9 per cent.

Bran alone was only 14 per cent. more attractive than the average of the four mixtures containing bran and sawdust in equal proportions.

FORD (A. L.) & LARRIMER (W. H.). U.S. Bur. Ent. **Some Factors influencing the Efficiency of Grasshopper Baits.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 292–299. [Received 22nd November 1921.]

In these experiments to test the relative value of Paris green, white arsenic and crude arsenic, molasses gave much better results than any of the other syrups tried, there being practically no difference between strengths of one or two quarts to 25 lb. of bran. There is very little difference in the three arsenicals when used under similar conditions at their optimum strengths and rates. Apparently higher strengths of Paris green are less effective than the lower ones. As a result of these experiments the strengths advocated are ½ lb. Paris green, ¾ lb. white arsenic or 1½ lb. crude arsenic to each 25 lb. of bran. The baits should be applied at the rate of from 5 to 10 lb. per acre.

SMITH (R. C.). **Observations on the Fall Army Worm (*Laphygma frugiperda*, Smith & Abbott), and some Control Experiments.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 300–305. [Received 22nd November 1921.]

In September 1920 *Laphygma frugiperda* suddenly appeared in large numbers in various localities in the central and east central parts of Kansas. The outbreak, the features of which are described in detail, was scattered and confined to occasional fields. This was apparently the first occurrence in such numbers since 1911. The Kansas bran mash gave excellent results against the larvae, but its efficacy was not greatly altered by the addition or omission of lemons. Sawdust substituted for bran was less effective, its pine odour and coarseness probably acting as a repellent. In the field, parasitism was at first 4 per cent., but later increased to 50 per cent., *Winthemia quadripustulata*, F., being the most common Tachinid. It is believed that the majority of larvae bearing Tachinid eggs escape by discarding the eggs when they moult. When larvae bearing Tachinid eggs were poisoned, the parasites were unable to develop. *Muscina stabulans*, Fall., was also bred from larvae of *L. frugiperda*.

SEVERIN (H. C.). **Harlequin Cabbage Bug in South Dakota.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, p. 305. [Received 22nd November 1921.]

Attention is drawn to the establishment of *Murgantia histrionica*, Hahn, in South Dakota. It chiefly attacks cruciferous plants, but

has also been recorded on potatoes, tomatos, beans, beets, squash, pumpkin, maize, plum trees and even poplars.

REINHARD (H. J.). **Peach Seedlings attacked by Dipterous Larvae.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 3, June 1921, pp. 305–306. [Received 22nd November 1921.]

Hylemyia cilicrura, Rond. (*Phorbia fusciceps*, Zett., of authors), is recorded as infesting peach seedlings in Texas. This fly is considered by Howard to be identical with *Anthomyia zeae*, Riley (seed corn maggot).

GRAHAM (S. A.). **Subcortical Temperature of Logs exposed to direct Sunlight.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 3, June 1921, pp. 307–308. [Received 22nd November 1921.]

From work conducted at the Minnesota Experiment Station the author has reached conclusions similar to those of Craighead [*R. A.E.*, A, viii, 365] so far as some species of logs are concerned. These experiments have also shown that, in northern latitudes at least, even on the brightest days some logs never reach a temperature fatal to insects. A summary of the results so far obtained is given here, details of which have been published elsewhere [*R. A.E.*, A, ix, 437].

In bright sunlight the subcortical temperature on the upper side of moderately thin barked logs often passes above a point fatal to insects, but this is not true of all logs, as thin barked Norway pine logs never exceeded a temperature of 46° C. during the summer of 1920. Solar radiation is one of the chief factors influencing the temperature. In the absence of solar radiation the subcortical temperature follows that of the surrounding air rather closely. The conduction of heat around a log is slow, but varies with different species, resulting in concentration of heat in limited areas. Movement of air tends to increase radiation and reduces thereby the subcortical temperature. The temperature is also lowered by the evaporation of water, as occurring in the morning or after rain from the surface layers of the bark. Close proximity to other radiating or absorbing surfaces tends to stabilise subcortical temperature.

SYMES (C. B.) & CHORLEY (J. K.). **Insect Pests of Mushrooms.**—*Fruit Grower, Fruiterer, Florist & Mkt. Gdnr., London*, li, no. 1313, 27th January 1921, pp. 142–145; no. 1314, 3rd February 1921, pp. 188–190; no. 1315, 10th February 1921, pp. 234–236; no. 1319, 10th March 1921, pp. 454–456; no. 1320, 17th March 1921, pp. 494–496. 7 plates, 23 figs. [Received 24th November 1921.]

Sciara praecox, Meig. (mushroom fly), which is frequently beneficial in causing early putrefaction and decay of the fungi attacking British trees, is the worst pest of mushrooms in Britain, sometimes completely ruining the crop. Its life-history varies greatly, according to the temperature or humidity of the mushroom house; in the field the pest is almost negligible. The eggs are laid in strings or batches of 9 to 12, or sometimes singly, either at the base of the mushroom, at the junction of stem and cap, between the gills, or in the angle between two adjacent stems converging at the base. An average of 30–35 eggs is laid by each female; the incubating period is 5 or 6 days at warm temperatures. The larva, which moults three times,

is described. Those on mushrooms frequently begin their attack just inside the skin at the base of the stem, while those hatched in the gills feed in the cap. At a temperature of 55° to 60° F., the average larval period is 23–24 days, at 65° to 70° F. it requires 17–18 days. When mature, the larva constructs a cell either in the soil or in the mushroom itself, just below the skin. Pupation occupies 7 or 8 days. The adults live 5 or 6 days in captivity, feeding on the films of moisture in the manure or soil, and quickly dying in dry surroundings.

Original infestation is due to the presence of adult flies in the mushroom houses, and also to importation of the immature stages with the manure. Many eggs and larvae are destroyed during the packing of the soil, but sufficient survive to form a first generation, from which a second is produced in less than a month, and it is the latter generation that oviposits on the first mushroom buttons appearing from 6 to 7 weeks after soiling. Larvae from these eggs produce small light brown patches of destroyed buttons and excreta around the mushroom stools, while the succeeding generation causes heavier infestation, the grubs often devouring all but the surface skins of the buttons. The attacks on mushrooms above ground are slight, the few days necessary for their development being insufficient for the larvae to be full-sized or to do much damage. The loss is greatest when straw litter is left on the bed, as this is an ideal breeding-place for the flies. A conservative estimate of the damage in a bed under these conditions was £35 to £40 per crop.

Natural means of control are almost negligible; the two great cultural factors are temperature and ventilation. Many artificial remedies were tested, but very few gave any success without severely damaging the crop, which is a very delicate one. The trials included fumigation of manure with benzine, or powder applications of 1 per cent. dichlorobenzine, 1 per cent. pyridine, pure pyrethrum, 1 per cent. crude quinoline, pure wood tar, and pure derris. Many kinds of traps were also tried. Recommendations suggested for the prevention of infestation, as a result of many experiments, are that houses should be provided with suitable walls and roofs to ensure an equable temperature, which for preference should be below 60° F. Ventilation should be adequate, and all vents and doors should be well covered with fine muslin cheese-cloth to prevent invasion from the outside. After an old bed is cleared out and before a new one is put down, a thorough fumigation with sulphur dioxide or hydrocyanic acid gas should be carried out. A second treatment, after the new bed has been soiled, but before the appearance of the mushrooms, will destroy all insects that have emerged from the introduced bed. After the second fumigation, traps consisting of white paper coated with an adhesive should be placed at intervals over the bed, especially under lights; this will capture practically all the insects that enter through the doors or that emerge from the bed after the second fumigation. These traps should be renewed and continued throughout the life of the crop. Frequent cleaning of the bed and sweeping of the paths should be practised. These measures involve scarcely any expense.

The second part of this paper, by Mr. Chorley, deals with other mushroom pests, which normally are of minor account, but which under certain conditions increase to such an extent as to endanger or even ruin the crop. Among these is the mite, *Tyroglyphus mycophagus*, the life-history and habits of which are so similar to *T. lintneri*, recorded as damaging mushrooms in America [*R. A.E.*, A, v, 424] that

it is thought that it may be the same species. During the whole of its life, except when in the hypopial stage, the mite feeds upon the running mycelium, thus preventing its spread, and upon the tissue of the mushroom. This mite has been known to cause complete failure of the bed for several weeks. It is particularly abundant in beds protected by straw. If such an infestation occurs in a large house, there is no remedy except removing the bed and thoroughly fumigating the house with either sulphur or hydrocyanic acid gas. Another mite, *Histiostoma rostroserratum*, has been recorded as swarming over mushroom beds in Paris and causing decay in young buttons, and the Tyroglyphid, *Rhizoglyphus spinitarsus*, is reported as destroying mushrooms in the caves at Reigate As a preventive, the French use lysol to spray the beds before the crop appears. Except for centipedes, the only natural check upon *T. mycophagus* is a predacious mite, *Gamasus* sp., which breeds in manure. A new species of *Pediculoides* was observed on the beds, and men working there have complained of slight dermatitis, which may be due to this mite.

A species of Collembola, *Achorutes armatus*, Nic., which is abundant on all mushroom beds, is described. Although there is some doubt as to the damage caused by these spring-tails, their presence depreciates the value of the crop and lowers the vitality of the mushrooms. Occasionally, for some unknown reason, they become gregarious, appearing in enormous numbers and remaining for a day or two and then dispersing. They are readily attracted to such paper traps as are described for *S. praecox*. Spraying the beds with nicotine or lysol before the mushrooms appear is also suggested. As humid conditions are favourable to them, watering should be as light as possible. Other species of Collembola reported as damaging mushrooms include *A. cyanocephalus*, Nic., *A. rufescens*, Nic., and *A. purpurescens*, Lubb. Species of woodlice infesting the beds include *Oniscus asellus*, *Porcellio scaber* and *Armadillidium vulgare*. Holes in the stem or cap are frequently due to these pests, and some of the young buttons are prevented from developing. The remedies are to remove all shelters and to prevent access to the bed.

The preventive measures recommended for *S. praecox* will also serve to reduce the numbers of these minor pests. Slices of freshly-cut potatoes poisoned with lead arsenate will help to destroy woodlice, and slugs can be kept off the beds by an application of lime and salt round the paths. A mixture of unslaked lime in the soil before capping is believed to be beneficial.

SMITH (K. N.) & WADSWORTH (J. T.). **The Carrot and Onion Flies. Some Preliminary Attempts at their Control.**—*Fruit-Grower, Fruiterer, Florist & Mkt. Gdnr., London*, li, no. 1322, 31st March 1921, pp. 575-578, and no. 1323, 7th April 1921, pp. 616-618, 13 figs. [Received 24th November 1921.]

Some preliminary efforts in the control of *Psila rosae* (carrot-fly) and *Hylemyia antiqua* (onion-fly), which are very serious pests, particularly in Lancashire and Cheshire, are recorded. The damage to carrots is caused by the larvae of *P. rosae* burrowing into the root and tunnelling in the outer cortex, making it useless for food, and admitting secondary pests, such as slugs and wood-lice. Discoloration of the root follows, with wilting and yellowing of the foliage and sometimes a reddening of the tops. Besides carrots, parsnips, celery, turnips and parsley are attacked. An undescribed Braconid of the genus *Dacnusa* is parasitic on the pupa of *P. roae.*

A series of experiments with various chemicals used as insecticides against *P. rosae* is described, and the results are shown in tables. On carrots sown in March, the first application was made about the third week in May, and continued five times at intervals of three or four weeks. Many of the substances tested proved useless; the most effective was green tar oil, which gave 89 per cent. clean carrots and is recommended at a strength of 1 part to 99 parts precipitated chalk scattered between the rows. Other chemicals recommended are heavy creosote and heavy cresylic acid, applied in a similar manner, and crude naphthaline and soap (the last, used at the rate of 1 oz. per sq. yard in equal proportions, gave 71 per cent. clean roots). Carrots sown in May showed much greater promise, the flies of the first generation having finished oviposition by the time they were of appreciable size, and they were practically free from attack until mid-August, when the second generation of flies was ready for oviposition. On these, ½ oz. of derris powder [1 oz. in table], mixed with double the quantity of soot, used over each square yard, gave the best results. Recommendations, therefore, include late sowing (in the second half of May) and the application of one of the above insecticides.

Hylemyia antiqua generally appears in early May and begins to oviposit about 7th June; from that date until September or later the maggots are always present, the flies breeding continuously and the generations overlapping. The eggs are laid in clusters, usually upon the onion, where they can easily be found and crushed by hand. The young larvae descend to the base of the onion and bore upwards into the bulb. Pupation takes place in the soil surrounding the onion. Leeks are also occasionally attacked. From 20 to 30 maggots may be found in one onion, infested plants showing wilting and discoloration, and finally lying prone on the ground. A Hymenopterous parasite, *Aphaereta cephalotes*, helped to reduce the second generation; this insect also parasitises *P. rosae*, though to a less extent.

In testing various insecticides none of the chemicals used gave a very high degree of immunity, though it is pointed out that the infestation of 1920, when the trials were made, was the worst experienced for many years; 68 per cent. immunity was obtained by the use of nicotine, 1 cc. in 5 gals. water, applied with a watering can; 60 per cent. with 2 parts soot and 1 part derris, 1 oz. of the mixture per square yard (soot alone, however, proved useless); 55 per cent with 1 oz. potassium permanganate in 2 gals. water, applied like the nicotine; 54 per cent. with carbolic acid, 1 pint, with 1 lb. hard soap in 1 gal. water, 1 part to 35 gals. water; and 51 per cent. with 1 oz. resin soap in 2 gals. water with ½ oz. sodium carbonate, applied with a watering can. Tar oils killed many of the plants, but used with another medium than sand might give better results.

While the time of sowing does not afford much help in control, some advantage might be gained by sowing under glass in January and planting out in the open in April.

Buckhurst (A. S.). **The Codlin Moth** (*Cydia pomonella*, **Linn.**). **Its Life-history in England.**—*Fruit-Grower, Fruiterer, Florist & Mkt. Gdnr., London*, lii, nos. 1352, 27th October 1921, pp. 642-643; 1353, 3rd November 1921, pp. 717-720; 1354, 10th November 1921, p. 753, 27 figs.

Cydia pomonella (codling moth) has been present in Great Britain probably since the time of the Roman invasion, its food-plants being

apples, pears, quince, plums, peaches, crab-apples, walnuts, chestnuts and oak-galls. Pears are apparently never attacked in this country by larvae of the second brood, nor entered at any other point than the calyx. The newly-hatched larvae feed for a day or two on the foliage of apples before entering the fruit, especially in the case of the second generation. Larvae have been reared in England to the fourth moult entirely on a diet of leaves, and it may be that in a bad year, when no fruit is available, some larvae may live on foliage only. The number of generations in a year depends upon climatic conditions; in the South of England there is usually a partial second generation, which in very favourable years may be complete. In 1921, adults of the first generation appeared in May, and a complete second generation was on the wing in July and August. A partial third generation appeared at the end of August. There are indications of a second generation in Ireland also.

A description of the stages of the moth is given, and the habits of the larvae, which pass through 6 instars of about 5 days each, are discussed. Eggs of the first generation were laid about mid-June, being placed singly on the foliage or fruit. The larvae hatch in 7 to 10 days and the majority enter the fruit at the calyx, a few entering at the side or where the stalk is attached. The pupal stage in the summer lasts about 14 days, the moths emerging during the first half of August; some of them, however, do not pupate the first year but pass the winter in the larval stage. Eggs of the second generation are laid singly, generally on the fruit, and the larvae show habits similar to those of the first generation, except that more of the fruit is consumed. Very few of these larvae reach the ground for pupation; they either remain on the bark, or the fruit is picked before they leave it, and cocoons are frequently constructed in the store-room. The winter is passed as a larva in the cocoon, pupation occurring about mid-May, and the moth emerging about three weeks later.

The author does not consider that the codling moth is responsible for many fallen apples, and it is rather difficult to estimate its importance as a pest in this country. Many fruit-growers disregard it. In gardens in the suburbs of London it is very common and sometimes destroys the crop, but in well-kept orchards in the same district it is seldom met with. Reports have at times been made of heavy losses to apples in the south-eastern and eastern counties, and the cider crops of the western counties have sometimes been almost ruined. The pest is not common in Ireland.

Pests liable to be confused in England with *C. pomonella*, owing to their habits, are *Hoplocampa testudinea* (apple sawfly), *Argyroploce* (*Penthina*) *variegana*, and *Tortrix ribeana*.

Natural enemies of the codling moth in Great Britain include birds, particularly tits, which destroy the hibernating larvae. No insect parasites have been observed during the author's breeding experiments. The most important of those present in Europe and America are briefly discussed. Remedial measures advocated are clean cultivation (destruction of fallen fruit, removal of loose bark, etc.), the encouragement of birds, banding the trees with burlap or netting to trap larvae [*R.A.E.*, A, v, 113], and the use of lead arsenate sprays, such as are frequently used in America and in France. The spray that gave success in England was composed of 5 lb. each of lead arsenate paste and soft soap to 100 gals. water. In rooms where apples are stored the windows should be covered with gauze to prevent any moths emerging there from escaping to the orchard.

EASTHAM (J. W.). **The Colorado Beetle in British Columbia.**—*Agric. Jl., Victoria, B.C.*, vi, no. 9, November 1921, p. 216.

This paper contains notes and observations additional to one already published [*R.A.E.*, A, ix, 560] on the Colorado beetle [*Leptinotarsa decemlineata*] in British Columbia, being chiefly concerned with its local distribution.

Proceedings of the Third Convention Western Plant Quarantine Board, Victoria, British Columbia, June 7 to 10, 1921.—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, x, no. 7, July 1921, pp. 221–305, 10 figs. [Received 24th November 1921.]

The current quarantine problems and the work of the Western Plant Quarantine Board are discussed, the various delegates giving accounts of the situation in Arizona, Idaho, Utah, Lower California, British Columbia, and Oregon. A copy is given of the resolutions drafted and passed at the meeting.

LICHTENSTEIN (J.-L.). **L'*Icerya purchasi*, Mask. [Hem. Coccidae] dans l'Hérault.**—*Bull. Soc. Ent. France, Paris*, 1921, no. 16, 26th October 1921, pp. 239–241.

LICHTENSTEIN (J.-L.) & GRASSÉ (P.). **De l'Apparition dans le Département de l'Hérault de l'*Icerya purchasi* et de la Teigne de la Pomme de Terre.**—*Progrès Agric. & Vitic., Montpellier*, lxxvi, no. 47, 20th November 1921, pp. 492–495.

An account is given of these two pests, which have recently been recorded for the first time in the Department of Hérault. *Icerya purchasi*, Mask., has probably been present for some years without having attracted attention. In one garden, where it is said to have occurred for the past two years, it is killing mimosa, roses and *Wistaria*, which it attacks for preference; it also damages *Sophora* and *Robinia*. Centres of infestation are at present isolated, but the scale multiplies rapidly and is easily carried by the wind. Moreover, the climate of the south of France is favourable to it, as the winters are not severe enough to kill it. Prompt measures are therefore necessary, and it is requested that any occurrence of the pest should be reported, and, above all, that transport of any parts of plants infested with it should be avoided. Infested parts of plants should be cut out and burnt, and the plants should be brushed with a strong nicotine solution or a polysulphide. It is hoped that the Coccinellid, *Novius cardinalis*, introduced to combat this pest, will ultimately prove of great assistance.

Against *Phthorimaea operculella*, Zell. (potato moth), an effort is being made to introduce the Braconid parasite, *Habrobracon johanseni*. Insecticides and bait traps have failed to reduce its numbers; the only successful remedy seems to be to store the tubers under a layer of sand and thoroughly disinfect the storehouses with a paraffin and soap emulsion. All infested tubers should be burnt, treated with lime, or boiled and used as food for stock. After the crop is gathered sheep turned into the fields will eat the infested plants that are left. Co-operation in these measures is essential.

TOWNSEND (C. H. T.). **Instrucções practicas para a Extincção da Saúva.** [Practical Instructions for Ant Destruction.]—*Chacaras e Quintaes, S. Paulo*, xxiv, nos 2-3-4, 15th August-September-October 1921; pp. 121-122, 219-220, 302-304.

This article gives a popular description of ants and of the various fumigation methods employed against them.

BONDAR (G.). **Os Insectos damninhos. XVIIA. A Broca do Tronco dos Coqueiros.** [Injurious Insects. XVIIA. The Larva infesting the Trunk of the Coconut.]—*Chacaras e Quintaes, S. Paulo*, xxiv, no. 4, 15th October 1921, pp. 276-279, 3 figs.

Coconut palms in Bahia are killed by a weevil, *Rhina barbirostris*, F., which oviposits in any part of the trunk, preferably in wounds or in the holes bored by the larvae of *Homalonotus coriaceus*, Gyll. The larva mines into the trunk perpendicularly to its axis and pushes the debris towards the surface, thus closing the entrance to various enemies. Very often sap exudes from the mines. On reaching the centre of the trunk the larva no longer expels the debris, but stows it in the sap channels. At this point butyric fermentation ensues, and the larva bores through the wood until just beneath the surface and pupates. The adult usually emerges from the trunk at night. Sometimes the trunk is perforated to such an extent that the top is broken off by wind. Most of the trees, however, remain intact, but the number of nuts produced decreases to a marked extent. Injured palms are often also infested by termites. *R. barbirostris* occurs in all stages in June, but while there does not appear to be any definite period for the appearance of the adults, it is believed that oviposition occurs chiefly from September onwards. In Brazil this weevil also develops in the trunk of *Cocos romanzoffiana*.

Natural enemies include a fungus that kills the larva, Tachinid parasites of the pupa, and birds that prey upon the adult.

To destroy the larvae in palms without crowns they must be felled and split open so as to expose the centre of the trunk to the sun. Other badly-infested palms should also be felled, though it may be possible to save some by injecting potassium cyanide, iron sulphate or copper sulphate. Recently-infested palms may be saved by injecting carbon bisulphide into the mines. The base of the stem may be protected by painting with carbolineum or tar. The careful application of preventive and curative measures for two or three years should eliminate this pest.

BONDAR (G.). **Os Insectos damninhos. XVIII. A Broca da Pimenta malagueta,** *Heilipus destructor*, **Bhn.** [Injurious Insects. XVIII. *H. destructor*, the Capsicum Caterpillar.]—*Chacaras e Quintaes, S. Paulo*, xxiv, no. 4, 15th October 1921, pp. 297-298, 2 figs.

Much damage is done to *Capsicum*, which is largely grown in the State of Bahia, by a weevil, *Heilipus destructor*, Boh., the larvae of which mine the stem and penetrate to the roots. The adults emerge through a hole, which reveals the infestation after its occurrence. The base of the stem should be minutely examined with a pocket-knife, and all infested plants burned.

GRANDI (G.). **Ricerche sul Gen.** *Philotrypesis*, **Först. (Hymenoptera. Chalcididae).** [Researches on the Genus *Philotrypesis*, Först.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric., Portici*, xv, 15th September 1921, pp. 33–190, 44 figs. [Received 24th November 1921.]

This monograph dealing with the symbiotic relation to the fig of the Hymenoptera concerned in caprification, discusses the morphology of these insects, and reviews their history and systematic position. The genus *Philotrypesis* is described, and the synonymy of all the known species is given.

FEYTAUD (J.). **Les Ennemis du Pin. La Tordeuse de Buol** (*Evetria buoliana*, **Schiffermuller).** [Pine Pests. *Rhyacionia buoliana*.]—*Rev. Zool. Agric. & Appl., Bordeaux*, xx, no. 8, August 1921, pp. 88-91, 2 figs. [Received 26th November 1921.]

Rhyacionia (*Evetria*) *buoliana*, Schiff. (European pine-shoot moth) is one of the most dangerous Tortricid pests of pines in France. As a rule the flight-period occurs at the end of June and in July, and the eggs are laid in August on the terminal shoots of young pine. The larva hatches early in autumn, and hibernates in a resin-covered groove on the shoot. It feeds in the following year from April to June; and pupates in the shoot at the end of May or in June.

R. buoliana appears to be a native of Central Europe. Various records of its injury in Europe and North America are mentioned. In France serious damage is done, especially in the Bordeaux region, and the injury is enhanced by that of an allied species, *R. turionana*. *Pinus sylvestris* is principally attacked, but *P. strobus*, *P. resinosa*, *P. laricio*, *P. montana*, etc., also suffer. In America the infestation began on *P. laricis* var. *austriaca* and *P. montana* var. *mughus* at the same time as on *P. sylvestris* imported from Europe. Trees from 6 to 15 years of age suffer most.

To prevent infestation Barbey has recommended the avoidance of unmixed plantations of pine in all cases where the soil permits the growth of other trees. Once infestation has begun the sole remedy consists in collecting the infested shoots, which should be burned or placed in receptacles permitting the escape of Hymenopterous parasites. The latter include *Pristomerus vulnerator*, Panz., *Cremastus interruptor*, Grav., *Orgilus obscurator*, Nees, *Ichneumon fugitivus*, Grav., *Pimpla ruficornis*, Grav., *Lissonota buolianae*, Hrt., *Triclistus curvator*, F., *Cremastus confluens*, Grav., *C. decoratus*, Grav., *Exetastes cinctipes*, Retz., *Limneriun geniculatum*, Grav., *L. albidum*, Gml., *Bracon discoideus*, Wsm., *Chelonus sulcatus*, Jur., *Perilampus laevifrons*, Dalm., and *Habritys brevicornis*, Ratz. Some predatory insects and birds also help to check this pest.

BONNAMOUR (S.). **Note sur deux Diptères parasites nouveaux de la Piéride du Chou** (*Drosophila rubrostriata*, **Beck. et** *Phora chlorogastra*, **Beck.**).—*Bull. Soc. Ent. France, Paris*, 1921, no. 15, 12th October 1921, pp. 217–219.

From the Lyons district two new parasites of *Pieris brassicae* are recorded. *Drosophila rubrostriata*, Beck., was brought from the Canary Islands on bananas and has readily become acclimatised. The flies live on organic vegetable or animal matter in decomposition; parasitism of insect larvae has not hitherto been recorded.

Observations indicate that the mere fact of oviposition into the larva of *P. brassicae* causes the latter to decompose and liquefy, contrary to the action of the Tachinid, *Compsilura concinnata*, Meig., which causes it to dry up. Further observations on the nature of the parasitism by *D. rubrostriata* are required.

Phora chlorogastra, Beck., of which one individual was reared at the same time as the *Drosophila*, is a rare southern species, which seems also to have become acclimatised in the Lyons district.

HEIKERTINGER (F.). **Bestimmungstabelle der Halticinengattung *Psylliodes* aus dem paläarktischen Gebiete mit Ausschluss Japans und der Kanarischen Inseln.** [A Key to the Halticine Genus *Psylliodes* from the Palaearctic Region, excluding Japan and the Canary Islands.]—*Koleopt. Rundschau, Vienna*, ix, no. 4–9, 30th September 1921, pp. 49–62. [Received 26th November 1921.]

This is the concluding part of the first section, which deals with the apterous species, and the first part of which has been already noticed [*R.A.E.*, A, ix, 418].

MUÑOZ-GINARTE (B.). **Consideraciones sobre el Cultivo de la Piña en Cuba.** [Notes on the Cultivation of the Pineapple in Cuba.]—*Estación Exptl. Agron., Santiago de las Vegas*, Bol. 45, September 1919, 48 pp., 16 figs. [Received 26th November 1921.]

The insect pests of the pineapple in Cuba are an ant, *Solenopsis geminata*, F., and a Coccid associated with it, *Pseudococcus citri*, Risso. They may be combated by spraying with an insecticide made up with 18 parts water and 1 part of an emulsion containing kerosene 2 gals. [U.S. ?], crude carbolic acid ⅞ pint, caustic potash soap ½ lb., and water 1 gal. This spray must not be applied when the fruit is forming.

FRANKLIN (H. J.). **Report of the Cranberry Station.**—*33rd Ann. Rept. Mass. Agric. Expt. Sta., 1920, Amherst*, 1921, pp. 32a–35a. [Received 29th November 1921.]

The study of insect pests of cranberries was continued [*R. A. E.*, A, ix, 49]. Hitherto unknown parasites of *Crambus hortuellus* (cranberry girdler) were reared. A new measure adopted against this moth was spraying with nicotine sulphate. It was found that this method was also successful against leaf-hoppers and spring-tails, which are usually abundant on bogs that are not reflooded, and which probably reduce the vitality of the plants considerably. Satisfactory results were obtained with nicotine sulphate sprays against *Rhopobota vacciniana* (black-head fire worm). *Epelis truncataria* var. *faxonii* (brown span worm) was unusually prevalent and appeared on more bogs than in 1919. Remedial measures were, as a rule, promptly applied, so that little harm was done, except on a few neglected bogs. *Cymatophora sulphurea* (green span worm) was also unusually abundant and completely destroyed a very promising crop covering several acres. *Trichogramma minutum*, the egg-parasite of the cranberry fruit worm [*Mineola vaccinii*] was less prevalent than usual.

FERNALD (H. T.) & BOURNE (A. I.). **Report of the Department of Entomology.**—*33rd Ann. Rept. Mass. Agric. Expt. Sta., 1920, Amherst*, 1921, pp. 36a–43a. [Received 29th November 1921.]

Further data are required concerning the best time for spraying for codling-moth [*Cydia pomonella*]; it is hoped that an early application of lead arsenate, about two weeks after the calyx spray, will be successful, as then it can be combined with a fungicide, whereas the usual application, four weeks after the calyx spray, is too late for this. Observations have been made on the seasonal appearance of some common Coccids, and studies of the squash vine-borer [*Melittia satyriniformis*] and squash bug [*Anasa tristis*] have been carried out.

Tests with several proprietary spray materials were made. White arsenic, with Bordeaux mixture, prepared on the lines described by Sanders and Kelsall in Canada [*R.A.E.*, A, viii, 150], provided that a very finely divided arsenic is used, was profitable, at least as a spray for potato pests, and proved far cheaper than lead arsenate, either in powder or paste form. Studies have been made of the composition of certain dry sulphides as substitutes for lime-sulphur concentrate, though there has been no opportunity for field tests with them. Lime-sulphur concentrate (1 : 8) proved much cheaper than dry lime-sulphur, barium tetrasulphide or soluble sulphur; these substances, at the strengths advised by their makers, will have much less of the active agent present, and should be far less effective. It is thought that the concentrate may prove effective at a weaker strength than that hitherto used.

No outstanding infestation of any insect is recorded for the year. The gipsy-moth [*Porthetria dispar*] was reported from Amherst for the first time, but in small numbers.

LAMBILLION (L. J. L.). *Zophodia* **Hb.** *convolutella* **Hb. où en est son Histoire naturelle?** [What is the Life-history of *Zophodia convolutella*, Hb.?]—*Rev. Mens. Soc. Ent., Namur*, xxi, no. 11, November 1921, pp. 41–43.

Continuing his investigations on a gooseberry pest thought to be *Zophodia convolutella* [*R.A.E.*, A, ix, 474], the author has taken 23 larvae of this moth in the third stage from gooseberry plants, and has found experimentally that they will attack the fruit of more than one variety of gooseberry. A small Ichneumonid, probably a species of *Microgaster*, was reared from the larva. The Tortricid, *Tortrix* (*Cacoecia*) *podana*, Sc., and the Pyralid, *Pionea prunalis*, Schiff., were found infesting the leaves of gooseberry plants.

FROGGATT (W. W.). **A Descriptive Catalogue of the Scale-insects ("Coccidae") of Australia. Part III.**—*N.S.W. Dept. Agric., Sydney*, Sci. Bull. 19, October 1921, 43 pp., 23 figs.

Pseudopsylla hirsutus, gen. et sp. n., on *Eucalyptus*; *Sphaerococcus cantentulatus*, sp. n., on *Acacia pendula*; *S. newmanni*, sp. n., and *S. turbinata*, sp. n., on *Melaleuca* sp.; and *Palaeococcus dymocki*, sp. n., on the basal stems of an undetermined shrub, are described.

ZACHER (F.). **Drahtwürmer und ihre Bekämpfung.** [Wireworms and Measures against them.]—Reprint from *Deutsche Landw. Presse, Berlin,* 1921, no. 60, 8 pp., 6 figs.

There are 34 genera and 135 species of wireworms in Germany, but some of these are not plant-feeders, the genera *Adelocera, Alaus* and *Hemirhipus* being predacious on other insects, and others living in moss or in dead or rotten wood.

Agriotes lineatus, L., is usually thought to be the most injurious species in Germany, but Reitter considers *A. ustulatus* to be the worst cereal pest. The larvae of *Agriotes* are cylindrical; those of *Selatosomus* are slightly flat. *A. lineatus* is the only species the life-history of which is accurately known. The eggs are deposited, from late June to mid-July, singly or in batches up to fifty or more, at a depth from ⅛ in. to 2½ in. in the ground. Those laid on the surface dry up and fail to hatch. Especially in the case of *Agriotes,* oviposition appears to depend on the presence of grass. The newly hatched larvae seem to feed on humus and decomposing matter in the ground. The author believes that both *Agriotes* and *Selatosomus* have a three-year life-cycle. Laboratory tests prove that the larvae are able to exist for many months in ground containing a few particles of humus. Larvae in the fields hibernate at a depth of 6–12 in., and those in meadows among the grass roots at a less depth. The pupal period is short, that of *A. obscurus* lasting only about three weeks. After emergence the adults remain underground for some time.

No remedial measure has hitherto given decisive results. Poison-baits, consisting of bundles of freshly cut clover wetted with an arsenical poison and covered with tiles or boards, have given fair results against the adults, but the author disagrees with the usual recommendation of poison-baits for the larvae. The interplanting of lettuce as a trap-crop is useful in gardens, as lettuce roots are highly attractive. Soil fumigation is usually too costly. The old method of intensive cultivation, which exposes the larvae to the weather and natural enemies, seems still to be the best measure of prevention, but it must be practised for at least three years.

JARVIS (E.). **A New Moth Pest of Sugar-cane and Maize. Leaf-eating Grass Worm** (*Laphygma exempta,* **Walk.**).—*Queensland Agric. Jl., Brisbane,* xvi, pt. 4, October 1921, pp. 276–280, 1 plate.

Sugar-cane leaves and young maize plants were damaged in February 1920 by *Laphygma exempta,* which also occurred in great numbers on grass-covered roads and headlands. This moth has not previously been recorded in Queensland. It is a native of Africa, where it attacks cereals and potatoes.

The larvae feed by day on sugar-cane leaves, and may thus be distinguished from those of *Cirphis unipuncta* (army worm), which feed by night. Experimentally the pupal stage occupied 7–11 days, the first moth emerging on 1st March.

The most important natural enemy is an undetermined Tachinid, which parasitised 33·5 per cent. of the larvae. Other enemies include the Hymenopterous parasites, *Metopius unifenestratus,* Morl., and *Iphiaulax dubitorius,* F., and the Carabid, *Ophonoides australis,* Dej.

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The larvae of the latter principally attack the caterpillars when crossing from one cane to another.

Remedial measures recommended against *L. exempta* have already been noticed [*R.A.E.*, A, iii, 359]. Action should be taken directly the larvae are observed.

Work in Connexion with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept., Antigua, 1919–20, Barbados*, 1921, pp. 11–12.

The larvae of the Antigua brown hard-back beetle, *Lachnosterna*, were again abundant in the cane and maize fields. This pest appears to have a life-cycle of about one year, a shorter period than that of the majority of similar larvae in other parts of the world. There seems to be a definite relationship between the appearance of sugar-cane plants attacked by root disease (*Marasmius sacchari*) and those infested with *Lachnosterna*. The total losses, which are attributed to the latter by planters, would be reduced by such cultivation and drainage as would eradicate or reduce the root disease. Pigs may be useful in checking *Lachnosterna*. The Scoliid parasite, *Tiphia parallela*, is fairly common in the fields, but only three beetle larvae out of 2,500 collected were found parasitised.

The weevil borer, *Metamasius* (*Sphenophorus*) *sericeus*, and the moth borer, *Diatraea saccharalis*, occurred in most cane-fields, but did little or no harm. *Diaprepes* (*Exophthalmus*) *esuriens* was also fairly common, but this weevil is not considered harmful.

Mordvilko (A. K.). **Злаковые тли (Aphidoidea). I.** [Aphids attacking Graminaceous Plants. I.]—**Известия Петроградской Областной Станции Защиты Растений от Вредителей.** [*Bull. Petrograd Div. Sta. Protect. Plants from Pests*], *Petrograd*, iii, no. 3, 1921, 72 pp., 19 figs. [Received 19th November 1921.]

This is the first part of a paper in which mention will be made of all Aphids attacking Graminaceous plants, with special consideration of those injurious to cultivated varieties. The general structure, characteristics and bionomics of Aphids, as well as their relation to ants, are described. The present instalment also includes keys* to the subfamilies and tribes, and to the genera and species belonging to the subfamilies Aphidinae and Pemphiginae that attack Graminaceous plants.

The species referred to in these keys include *Rhopalosiphum davisi*, sp. n. (*R. howardi*, Davis), on the leaves of *Elymus canadensis*, *E. virginicus* and *Dactylis glomerata* in the summer, in North America; *Hayhurstia*, gen. n. (erected for a single species), *H. dactylidis*, Hayhurst, on *Dactylis glomerata*, in North America; *Brachycolus slavae*, sp. n., from North Russia, on leaves of *Dactylis glomerata*; *Toxoptera jaroslavi*, sp. n., on *Calamogrostis*, in the Pskov district; *A. maidis*, Fitch (*avenae*, Kalt., nec F., nec Mordv.); *Siphonaphis padi* (*avenae*, auct., nec F.); *S. padi americana*, subsp. n. (*Siphocoryne avenae*, Perg., and other American authors); *Geoktapia areshensis*, gen. et sp. n., on numerous Graminaceous plants, in Eastern Transcaucasia; *Aresha shelkovnikovi*, sp. n., on roots of rice, in the Elisavetpol district; *Sipha glyceriae*, Kalt. (*schoutedeni*, Del Guer.); *Sipha* (*Chaitophorus*) *flava*, Forbes, on leaves of *Panicum sanguinale* and other Graminaceous

* [A translation of portion of these Keys will be published in an early part of the Bulletin of Entomological Research.—Ed.]

plants in North America; *S.* (*C.*) *agropyronensis*, Gill., on the upper surface of leaves of *Agropyrum glaucum*, in Colorado; *S. uvarovi*, sp. n.; *S. kurdjumovi*, sp. n.; *S. arenarii*, sp. n.; *S. tshernavini*, sp. n.; *Allaphis caricis amurensis*, subsp. n.; *Anoecia pskovica*, sp. n. (exclusively a root feeder); *Rectinasus caucasicus*, sp. n.; *Paracletus portchinskyi*, sp. n.; *Schoutedenia*, gen. n., erected for *Geoica cyperi*, Schout., on roots of *Cyperus*, in Belgium; *Hemitrama bykovi*, gen. et sp. n.; *Forda* (*Pemphigella*) *follicularia*, Pass., on stems and branches of *Pistacia*, in the South of Europe, Transcaucasia, Asia Minor and Turkestan; *F. proximalis*, sp. n.; *F. wilsoni*, sp. n., from North America; *Tychea silvestrii*, sp. n.; and *Tetraneura ulmi*, De G., of which the following are synonyms: *Amycla fuscifrons*, Koch, *Pemphigus zeae-maydis*, Duf., *P. boyeri*, Pass., *P. caerulescens*, Mordv., *T. setariae*, Del Guer., *Byrsocrypta graminis*, Schout., *T. ulmisacculi*, Patch, and *T. yezoensis*, Mats.

HILL (G. F.). **Notes on some Diptera found in Association with Termites.**—*Proc. Lin. Soc. N.S.W., Sydney*, xlvi, pt. 2, May–July 1921, pp. 216–220, 9 figs.

The Trypetid, *Rioxa termitoxena*, Bezzi, and the Syrphids, *Psilota* sp. and *P. cyanea*, sp. n., have been found in Northern Australia in the trunks of living trees in association with *Mastotermes darwiniensis*, Frogg., and *Calotermes irregularis*, Frogg.

Attempts to rear the larvae of *R. termitoxena* on various fruits, or to induce adults to breed in captivity, have failed. Pupation occurs a few inches below the ground surface and lasts from 8 to 11 days. None of the indigenous or introduced fruits are known to be attacked by this fly.

ACKERT (J. E.) & WADLEY (F. M.). **Observations on the Distribution and Life History of** *Cephalobium microbivorum*, **Cobb, and of its Host,** *Gryllus assimilis*, **Fabricius.**—*Trans. Amer. Micros. Soc., Menasha, Wisconsin*, xl, no. 3, July 1921, pp. 97–115, 3 figs., 1 plate.

Cephalobium microbivorum, Cobb, a Nematode parasite of *Gryllus assimilis*, F., does not appear to be definitely harmful to its host. Other parasites of the crickets examined include Gregarines and larvae of *Paragordius varius* and of Sarcophagid flies.

HERRICK (C. A.). **A Sarcophagid Parasite of the Common Field Cricket.**—*Trans. Amer. Micros. Soc., Menasha, Wisconsin*, xl, no. 3, July 1921, pp. 116–117.

Sarcophaga kellyi, Aldr., is recorded as parasitising *Gryllus assimilis*, F., in Kansas.

KNOWLES (C. H.). [**Report of Acting Entomologist.**]—*Ann. Rept. Fiji Dept. Agric. 1920, Suva*, Council Paper no. 39, 1921, pp. 7–8. [Received 30th November 1921.]

Most of the information given in this report has already been noticed from other sources [*R.A.E.*, A, ix, 263, 502, 595].

Coconuts from Rotuma were infested with a scale that was not *Aspidiotus destructor*, and another scale, found on leaves of an

indigenous plant, *Barringtonia racemosa,* was neither this species nor *A. transparens.*

A leaf-miner heavily infested mustard leaves, on which numerous small black flies were seen.

PAX (F.). **Beobachtungen über Beschädigungen von Bleikammern durch Holzwespen.** [Observations on Damage to Lead Chambers by Wood Wasps.]—*Jahresh. Ver. schles. Insektenk., Breslau,* xiii, 16th December 1921, pp. 43–56, 1 plate.

The floors of the lead chambers in a new sulphuric acid factory, built at a cost of 3½ million marks early in 1921, near Saarau, Silesia, proved leaky when tested with water, owing to the presence of small, circular holes, and examination in July and August showed that all the constructional timber was infested with wood-wasps. In one instance no less than 15 holes were found in 32 inches of a wooden pillar. Timbers that were split open revealed many larval mines, pupae and adults. Some of the perforations in the lead floor-plates led back to the underlying wood flooring, and some dead wasps were found half in the wood and half in the lead. Only the floor-plates, which were in contact with the wood flooring, were perforated. The lead sides were separated from the wood casing, so that in this case the insects could emerge without working through the lead. *Sirex gigas,* L., was the species principally concerned, but *S.* (*Paururus*) *juvencus,* L., and *S.* (*P.*) *noctilio,* F., were also present. It is probable that all three are equally injurious.

Replacement of the infested timber was not feasible on account of the enormous cost, nor was it possible to wait until all the adults had emerged before repairing the lead chambers. The infestation may possibly last until the end of September 1923. Fumigation with hydrocyanic acid gas, or the employment of heat to destroy the insects, is not practicable owing to the size of the buildings. Oviposition may be prevented by painting with carbolineum, but existing infestation would not be eliminated thereby, and boring sometimes occurs through an impregnated layer. The only feasible measure was a protective metal sheet between the lead and the wood. An intermediate layer of iron plates was therefore placed in position, at a cost of 100,000 marks, after which the trouble ceased; but for technical reasons it may be necessary to remove this later on.

As it is believed that SIRICIDAE usually oviposit in unhealthy or freshly-felled coniferous timber, care must be taken in selecting the wood for sulphuric acid factories. This was not done in the case in question, for the timber showed traces of infestation by other insects as well, including *Pissodes piceae, Trypodendron lineatum,* and a species of *Hylastes,* perhaps *H. angustatus.*

Infestation of freshly-felled timber by wood-wasps may be prevented by painting with carbolineum or creosote, or such woods as are not attacked by Siricids should be used for the flooring of lead chambers.

FERDINANDSEN (C.) & ROSTRUP (S.). **Oversigt over Sygdomme hos Landbrugets og Havebrugets Kulturplanter i 1920.** [Report on Insect Pests and Fungous Diseases of the Field and Orchard in 1920.]—*Tidsskrift for Planteavl, Copenhagen,* xxvii, 1921, pp. 697–759.

The cereal pests recorded are:—*Contarinia tritici* and *Sitodiplosis mosellana* (*C. aurantiaca*), which severely attacked wheat and barley,

the varieties of barley in which the ear develops early being the most injured; *Oscinella* (*Oscinis*) *frit*, which did much less damage than in the preceding years, though in June its attacks in late sown fields were considerable; and *Chlorops taeniopus*, which was of small importance in most localities. Minor pests of cereals were a thrips (*Limothrips denticornis*) on rye and barley; *L.* (*Thrips*) *cerealium* on barley; an Aphid, probably *Macrosiphum granarium* (*cereale*), on barley and oats; *Phyllotreta vittula* on barley; and *Trachea* (*Hadena*) *secalis* on rye. Many mines of *Hydrellia griseola* were met with in leaves of barley and oats, and *Calandra granaria* and *Silvanus surinamensis* did some damage in stored grain.

Pests of peas included larvae of *Cydia* (*Grapholitha*) sp., *Sitona lineata*, and thrips, especially *Kakothrips pisivora* (*Physapus robustus*). *Aphis rumicis* (*papaveris*) was recorded on broad beans

Pests of cabbage, rape, turnips and beet also included *A. rumicis*, the attacks of which were stopped at the end of June by rain and the appearance of the fungus, *Empusa* (*Entomophthora*) *aphidis*. *Silpha opaca* did much damage in Jutland during the long summer drought, and in many places the fields were quite destroyed by it. *Pegomyia hyoscyami* was very numerous in the leaves of beet. *Chaetocnema concinna*, *Cassida nebulosa* and *Gortyna* (*Hydroecia*) *micacea* were minor pests of beet. Flea-beetles, including *Phyllotreta nemorum*, were common, especially on cabbage, but the damage done was rather less than in preceding years. *Ceuthorrhynchus quadridens*, mining in the leaves, *C. sulcicollis*, in galls on the roots, and *C. contractus*, attacking the lower surface of the leaves, injured cabbages, as also did *Pieris brassicae* and *P. rapae* in the autumn, though great numbers of them were parasitised by *Apanteles glomeratus*. Spraying with salt and water (a handful of salt to a pailful of water) was effective against them; a stronger solution injured the plants. A 2 per cent. nicotine sulphate solution in Bordeaux mixture with 2 per cent. resin soap added was also effective. *Phorbia* (*Chortophila*) *brassicae* was troublesome in some places, especially in gardens. Curly leaf disease, caused by the midge, *Contarinia nasturtii*, did much damage, especially to cauliflower. *Plutella maculipennis* (*cruciferarum*), *Eurydema oleraceum* and *Brevicoryne* (*Aphis*) *brassicae* were minor pests of cabbage. Much damage was caused to seeds of cabbage, turnips, etc., by *Meligethes aeneus* and *Ceuthorrhynchus assimilis*, and especially by *Perrisia* (*Cecidomyia* *brassicae*.

On carrots very severe attacks by *Trioza viridula* and *Psila rosae* were reported. The latter also infested celery. Some damage was done to potatoes by *Calocoris norvegicus* (*bipunctatus*) and perhaps other bugs, and by *Gortyna* (*Hydroecia*) *micacea*. On lucerne and clover attacks were recorded from Aphids, *Sitona lineata*, *Hypera* (*Phytonomus*) *variabilis*, *Apion apricans*, *Subcoccinella vigintiquatuorpunctata* (*Lasia globosa*) and *Contarinia* (*Diplosis*) *loti*. *Apamea testacea* and *Cleigastra flavipes* attacked timothy grass.

Apple and pear pests included Capsids, *Psylla mali*, various Aphids, including *Aphis* (*Dentatus*) *sorbi* and *A. pomi*, Coccids, *Eriocampoides limacina*, *Anthonomus pomorum*, *Blastodacna putripenella*, *Hyponomeuta malinellus*, *Enarmonia* (*Grapholitha*) *woeberiana*, *Argyroploce* (*Olethreutes*) *variegana*, *Eucosma* (*O.*) *ocellana*, *Zeuzera pyrina*, *Malacosoma* (*Gastropacha*) *neustria* and *Diloba coeruleocephala*. *Cheimatobia brumata* and *C. boreata* did so much damage in Jutland that apple and pear trees were completely defoliated. Spraying with Paris

green with or without Bordeaux mixture or lime-sulphur was effective against them. *Contarinia* (*Cecidomyia*) *nigra* was somewhat injurious in Jutland, but *Perrisia* (*C.*) *pyri* was observed in only one locality. *Paratetranychus pilosus* and *Eriophyes pyri* also occurred.

Pests of stone fruits included *Eriocampoides limacina*, *Hoplocampa fulvicornis*, *Argyresthia ephippiella*, *Lyonetia clerkella*, *Cheimatobia brumata*, *C. boreata*, *Diloba coeruleocephala*, *Eulecanium* (*Lecanium*) *corni*, and the Aphids, *Hyalopterus pruni*, *Phorodon humuli* and *Anuraphis* (*Brachycaudus*) *helichrysi* in immense numbers on plums. *Myzus* (*Myzoides*) *persicae* occurred on peaches and *M. cerasi* on cherries. Tobacco extract was of only limited value against the Aphids.

On raspberries were recorded *Otiorrhynchus picipes*, *Byturus tomentosus*, *Incurvaria rubiella*, *Pennisetia* (*Bembecia*) *hylaeiformis* and Aphids. Pests of gooseberries, currants and black currants included Capsids, Aphids, especially *Eriosoma* (*Aphis*) *grossulariae* and *Rhopalosiphum ribis* mainly on black currants and *Eriosoma* (*Schizoneura*) *fodiens* on the roots of currants, *Otiorrhynchus picipes* on currants, sawfly larvae, perhaps those of *Pteronus ribesii*, common on gooseberries, and *Eriophyes ribis* on black currants everywhere.

On hazel, an Aphid, *Callipterus coryli*, and a mite, *Eriophyes avellanae*, were recorded.

Strawberries were attacked by Capsids, *Gortyna micacea*, *Tarsonemus fragariae* and *Anthonomus rubi* On melons *Aphis gossypii* appeared in one locality in such numbers that all the plants died. *Acrolepia assectella* did damage to leeks and *Hylemyia antiqua* to onions.

Crioceris merdigera was very injurious to lilies in one locality, and roses were commonly attacked by *Typhlocyba rosae*, *Aphis rosae*, *Blennocampa aethiops*, *B. pusilla*, and especially *Ardis bipunctata*. On lilac and privet the mines of *Gracilaria* (*Xanthospilapteryx*) *syringella* were commonly met with. *Perrisia* (*Cecidomyia*) *affinis* damaged violets, and *Phytomyza affinis* infested cultivated chrysanthemums.

The general pests recorded were *Agriotes lineatus*, *Tipula paludosa* and other species of *Tipula*, which were very injurious; *Forficula auricularia*, *Melolontha melolontha* (*vulgaris*), *Phyllopertha horticola* and *Euxoa* (*Agrotis*) *segetum* were of less importance.

JABLONOWSKI (J.). **Kártékony állat-e a fogasnyakú gabonabogár** (*Silvanus surinamensis*, **L.**) **?** [Is the Saw-toothed Grain Beetle, *S. surinamensis*, injurious to Stored Grain?]—Reprint from *Kisérletügyi Közlemények, Budapest*, xix, no. 3–4, 1916, 36 pp., 3 figs. (With a Summary in German.)

Various opinions have been held as to whether *Silvanus surinamensis*, L., is carnivorous and useful as an enemy of *Calandra* (*Sitophilus*) *granaria*, or a grain-feeder and, therefore, injurious. Nearly all records of injury to grain and of annoyance to the inmates of dwellings come from America and Hungary. In Hungary it occurs together with *C. granaria*, the presence of which is encouraged by storage of grain in unsuitable buildings. Scarcity of food compels the migration of both beetles. Such migration in the case of *S. surinamensis* occurs in the second half of the year or in the early winter months. There seems to be but one generation. The egg, larva and pupa are found

in spring and early summer, while the adult occurs from June to January. Exceptions to this rule occur.

In the author's opinion this beetle is carnivorous, but not particularly useful, while it may be a great nuisance in dwellings. Zacher has concluded that the larvae and adults cannot live on uninjured grain and die unless other food is available, that they cannot live on animal remains (exuviae of flour-beetle larvae, etc.), but that they can live on coarse ground grain.

BAKÓ (G.). **Az 1915 és 1916 évi szölömolyirtó kisérletek tanulságai.** [Results of Work against the Vine-moths in 1915 and 1916.]—Reprint from *Kisérletügyi Közlemények, Budapest,* xx, no. 1, 1917, 47 pp. (With a Summary in German.)

In spraying experiments against *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., it was found that the scorching that occurred was not due to potash soap or Bordeaux mixture, but to the excess of injurious inorganic salts in the Hungarian tobacco lye mixed with these substances. Hungarian nicotine sulphate never caused injury. Careful spraying for the first or spring generation is a successful measure against these pests. On the other hand, treatment against the second or summer generation is useless. Some good results were achieved with a dilute petroleum emulsion, 1 part in 10 of water.

JABLONOWSKI (J.). **A réti gyapjaspille mezögazdasági kártékonysága.** [The Woolly Meadow-moth, *Hypogymna morio*, L., its Noxiousness, and Prevention.]—Reprint from *Kisérletügyi Közlemények, Budapest,* xxiv, no. 1, 1921, 18 pp., 3 figs. (With a Summary in English.)

The woolly meadow-moth, *Hypogymna morio*, L., injures graminaceous plants on flat pastures in the Hungarian lowlands. If very abundant it may attack the seeds of cereals growing near by. There is only one generation a year. The adult flies from mid-May to early June. The larvae rest during summer, autumn and winter underground or under dead and dried stubble. They begin feeding early in spring and continue doing so till mid-May. When the grasses have been devoured, wheat, rye, etc., are attacked. The best remedial measure is the free use of a brush harrow at the proper times; this will destroy large numbers of the larvae. Data on the losses caused in Hungary are given in a series of graphs.

BAKÓ (G.). **Szölömolyirtás az 1917 évi kisérletek alapján.** [Experiments against Vine-moths in 1917.]—Reprint from *Kisérletügyi Közlemények, Budapest,* xxiv, no. 2, 1921, 20 pp. (With a Summary in German.)

No injury to grape flower-clusters was observed in 1917 when spraying was done with the improved Hungarian tobacco lye of 1917 (Thanaton), or with diluted petroleum emulsion. Such tested insecticides may be used at any stage of development of the clusters against the first generation of *Clysia ambiguella*, Hb., or *Polychrosis botrana*, Schiff.

TRÄGÅRDH (I.). **Några anteckningar om barrlössens förekomst på våra odlade barrträd.** [Some Notes on the Occurrence of *Chermes*, on our Cultivated Conifers.]—*Lustgården, Årsskrift för Föreningen för Dendrologi och Parkvård*, i., 1920, pp. 108–118, 6 figs.

This paper contains a popular account of the biology of *Chermes*, and gives a preliminary list of the species hitherto found in Sweden and of the trees on which they were found.

Galls of *C. abietis* have been found on *Picea alba*, *P. engelmanni*, and *P. sitchensis*, though comparatively seldom on the latter. On *P. orientalis*, in Scania, a gall was found, possibly produced by *C.* (*Pineus*) *pini*. Of species not producing galls, *C. piceae* and *C. nüsslini* are the most important, the former occurring on the trunk and the branches of *Abies pectinata*, while the latter attacks only the shoots and needles of both young and older trees. *C. piceae* has been found by the author in Scania, and has also been recorded from *Abies nordmanniana* at Alnarp. *Abies sibirica* was attacked in a nursery at Stockholm by a species that probably is *C. pectinatae*, Chol. On *Abies sibirica*, *A. nobilis*, *A. balsamea*, *A. nordmanniana* and *A. pectinata*, the shoots often become deformed by the attack of these Aphids, the buds disappearing through the excessive growth of the bark-tissue of the shoots. *C.* (*Pineus*) *pini* is recorded on *Pinus silvestris*, and *C.* (*Pineus*) *strobi* on *Pinus strobus*. On *Abies subalpina*, *A. arizonica* and *A. cilicica* other species of *Chermes* have been found, but have not yet been identified.

TRÄGÅRDH (I.). **Tallbastborren och granbastborren, två fiender till skogskulturer.** [*Hylastes ater* and *H. cunicularius*, two Pests of Forest Plantations.]—*Statens Skogsförsöksanstalt, Stockholm*, Flygblad no. 19, 1920, 6 pp., 5 figs.

A popular account is given of these two beetles, based on investigations conducted by the author in Sweden during recent years. The scarcity of data relating to injuries caused by them is undoubtedly due to the fact that such injuries are commonly confused with those due to *Hylobius abietis*. Injury by *Hylastes* is, however, chiefly to be found on the roots and at the base of the stems, and the mines are more or less gallery-shaped, with the edges overhanging the galleries, whereas those made by *Hylobius* are more or less rounded and narrowest at the bottom, with gradually sloping sides, and occur higher up on the trees. *Hylastes ater* seems to swarm a little earlier than *H. cunicularius*, both species appearing after *Myelophilus* and *Hylastes* (*Hylurgops*) *palliatus*, but earlier than *Ips typographus*.

Control measures are essentially the same as against *Hylobius*. Plantations should not be started in the vicinity of recent cuttings during the two following years. Injured trees must be removed and burned, care being taken to remove gently at the same time the earth surrounding the roots, many beetles being found there, which would otherwise escape.

TRÄGÅRDH (I.). **Bokskökldlusen.** [*Cryptococcus fagi*, **Baer.**]—*Statens Skogsförsöksanstalt, Stockholm* Flygblad no. 21, 1921, 4 pp., 1 fig.

Cryptococcus fagi occurs in Southern Sweden, but is comparatively rare; in some localities only have severely attacked beeches been found, the trunks up to 10–13 feet above the ground being covered

by the white, waxy matter excreted by the scales. The eggs are found in August, and the larvae appear later in the autumn. A very remarkable fact is that in Sweden no enemies of the beech scale seem to occur, neither Coccinellids, Syrphids nor mites having been found preying on it. Another very striking feature is the apparently haphazard occurrence of the scales, one beech being quite covered by the waxy matter, while the neighbouring ones are practically free from scales. No explanation of this is available, but Rhumbler has advanced the theory that only trees suffering from attacks of fungi are liable to be thus infested. Cutting down the heavily infested trees is recommended, provided this is done in winter or early spring, when there is no risk of the scales being spread by the wind.

TRÄGÅRDH (I.). **Den större märgborrens skadegörelse och dess bekämpand.** [*Myelophilus piniperda*, its Damage, and how to Control it.]—*Statens Skogsförsöksanstalt, Stockholm*, Flygblad no. 22, 1921, 8 pp., 1 table.

The results of these investigations have already been noticed [*R. A. E.*, A, vii, 422].

KEMNER (N. A.). **Lövvedborren.** [*Anisandrus dispar*, F.]—*Meddelande no. 202 från Centralanstalten för försöksväsendet på jordbruksområdet.* Ent. avdeln., no. 36, 1920, 8 pp., 7 figs.

Xyleborus (*Anisandrus*) *dispar* has been found not only in fruit trees, but also in birch and alder. Severe injuries have been recorded from ten of the Swedish counties, young trees having been mainly attacked. As remedial measures the author suggests thorough inspection of all imported trees and of all trees from nurseries, cutting off and burning branches attacked, and the use of traps formed of branches suspended in the trees that require protection.

SYLVÉN (H.). **Orsaker till flertoppighet hos tallplantor.** [The Cause of multiple terminal Shoots in Pine Trees.]—*Skogen*, 1920, pp. 1–19, 16 figs.

The author records the following insects as deforming the growth of pine trees by killing the original leading shoot:—*Rhyacionia* (*Evetria*) *buoliana*, *R.* (*E.*) *resinella*, *R.* (*E.*) *duplana*, *R.* (*E.*) *turionana*, *Myelophilus piniperda*, *M. minor*, *Lyda stellata*, *Hylobius abietis*, *Pissodes notatus*, *Magdalis violacea* and *Hylastes ater*.

ELGSTRAND (A.). **Ett försök med Grohmanns snytbaggefälla.** [An Experiment with Grohmann's Trap for Pine Weevils.]—*Skogen*, 1921, pp. 225–229, 3 figs.

The author prepared four traps according to the method proposed by Grohmann (Tharandter Forstl. Jahrbuch, vol. 64, 1913) on an area where the trees had been cut in 1916, in order to ascertain whether any pine weevils [*Hylobius abietis*] still occurred there. The traps were prepared in the spring of 1920 and examined in the beginning of June 1921. As a result 630 larvae of pine weevils and 1,098 larvae of *Hylastes ater* were found. The author suggests that this trap should be subjected to further trials, as it is cheap to prepare and apparently effective.

TRÄGÅRDH (I.). **Björksplintborren ock trädödaren två fiender till våra björkdungar.** [*Scolytus ratzeburgi* and *Cossus cossus*, two Enemies of our Birch Groves.]—*Lustgården, Årsskrift för Dendrologi och Parkvård*, ii, 1921, pp. 119–127, 10 figs.

Scolytus ratzeburgi does not breed in felled birch trees or in wood cut for fuel, and is therefore much scarcer and less often injurious to birches than the common bark-beetles of spruce and fir are to those trees. Nevertheless, this beetle may attack and finally kill quite healthy trees, if wood from birches infested in the forest is stacked year after year in the close vicinity of birch plantations. Such an attack was studied by the author in 1920. Some unhealthy birch trees were found to have a number of large, oval wounds through the bark; these were old egg-galleries of the bark-beetle. On one tree, about 45 ft. high and about 12 in. in diameter, at breast-height, 125 such holes were found in different stages of development. Of these 40 were old egg-galleries where no eggs had hatched, 46 were egg-galleries with more or less developed larval galleries, in which, however, no larvae had become full-grown, six were egg-galleries from 1919 with fully developed larvae or pupae, and 29 were new galleries containing newly laid eggs. Some of the old wounds were more than 14 years old, and it is evident that these birches had been repeatedly, perhaps annually, attacked by the beetle emerging from the infested fuel wood stacked in the vicinity.

Cossus cossus during recent years has often been found in birch trees in Sweden. The author believes that it is essential in the case of this moth for the bark of the attacked tree to be already injured. Consequently the young larvae are frequently found in the galleries due to other insects, such as those made by *Cryptorrhynchus lapathi*. Moreover, it is evident that the moth in ovipositing prefers trees already attacked by the larvae, it being common to find larvae of several different broods in the same trunk.

GRANLUND (F.). **En farlig parasit.** [A Dangerous Parasite, *Xyleborus dispar*.]—*Sveriges Pomologiska Förenings Årsskrift*, xxii, 1921, pp. 146–148, 2 figs.

A popular account is given of the life-history and the damage done by this beetle. Apple, pear and cherry trees are attacked, preferably young trees, under 20 years old. Cutting off and burning the infested branches is recommended as a remedy.

SCHØYEN (T. H.). **De almindeligste skadeinsekter paa landbruksplanterne.** [The most common Agricultural Insect Pests.]—*Christiania*, 1921, 52 pp., 41 figs.

This text-book for the use of agricultural schools contains chapters on the following subjects:—The relation of insects to cultivated plants; prophylactic measures; direct control measures, traps, chemical methods, etc., and the classification and development of the various orders.

A key to the insects is appended, arranged according to the plants attacked and to the nature of the injury.

DIFFLOTH (P.). **Comment lutter contre les Ennemis des Arbres d'Ornement.**—*La Vie Agric. & Rur., Paris*, xix, no. 48, 26th November 1921, pp. 377–380, 4 figs.

Ornamental trees are particularly liable to insect attack, as they lose in transplanting all the advantages of their natural habitat in

the forest. The general forms of injury due to insects, including both primary and secondary attacks, are discussed. Natural means of control occur in the form of parasites, chiefly Hymenoptera, that help to reduce the numbers of pests. The importance of preventing injury by keeping the trees in good condition is emphasised. Wounds should be immediately treated, and other methods are pruning, manuring, banding and spraying. The substances most generally used in spraying and apparatus suitable for their application are described.

Bijdrage tot de Kennis van de Leefwijze van den Wintervlinder. [A. Contribution to the Knowledge of the Life-history of the Winter Moth.]—*Tijdschr. Plantenziekten, Wageningen,* xxviii, no. 8, August 1921, p. 91. [Received 2nd December 1921.]

Attention has been drawn to a habit of the winter moth [*Cheimatobia brumata*] that prevents banding from being an absolute protection against this pest. It sometimes happens that the female is carried to the top of the tree by the male, and oviposition then takes place in the crown. In spite of this, banding remains an excellent measure for decreasing the amount of infestation.

MATTEI (G. E.). **La Difesa dai Parassiti.** [Defence against Plant Enemies.]—*Allevamenti, Palermo,* ii, no. 11, 15th November 1921, pp. 348–349.

The cultivation and selection of those varieties of plants that are resistant to insect and fungous pests is advocated in preference to the quarantines and other remedial measures now employed, all of which the author considers to be more or less unsatisfactory. If this course had been followed in the case of the grape-vine, the present position with regard to *Phylloxera* would be different. An editorial note to this article points out that imported natural enemies sometimes constitute the only defence at present available.

HEYMONS (R.). **Ein Beitrag zur Kenntnis südafrikanischer Borkenkäfer.** [A Contribution to the Knowledge of South African Bark-beetles.]—*Mitt. Zool. Mus., Berlin,* x, no. 1, October 1921, pp. 97–114, 9 figs. [Received 3rd December 1921.]

Bark-beetles are rare in Africa, and South-West Africa is especially poor in them. Only two species are represented in the collection here described, viz., *Sphaerotrypes brunneus,* sp. n., which is very closely allied to *S. barbatus,* Hag., from Sumatra and Kamerun, and *Dacryostactus kolbei,* Schauf., infesting the bark and wood of a Meliaceous tree.

AGUILÓ Y GORSOT (J.). **La Lucha contra la Mosca del Olivo. El Sistema Lotriónte en el Parque Samá.** [Work against the Olive Fly. The Lotrionte System in the Samá Property.]—*Rev. Inst. Agríc. Catalán de S. Isidro, Barcelona,* lxx, no. 11, November 1921, pp. 213–215.

In 1921 an energetic campaign was carried out in the province of Tarragona against the olive fly, *Dacus oleae,* the Berlese and Lotrionte methods being recommended [*R.A.E.*, A, ix, 421]. As the former was likely to be preferred on account of its lower cost and greater simplicity, an extensive test of the latter was made on about 2,000 trees, so as to obtain comparative data. The work began on 20th June.

Honey was substituted for molasses, 14 per cent. less of the former being used on account of its greater sweetness. The formula used was: water 11½ gals., honey 36 lb., borate of soda 2 lb., boric acid 2 lb., anhydrous sodium arsenite 2 lb. One trap [*R. A.E.*, A, ii, 289] per tree was used, and it was found that an operator working a sprayer, such as is employed in treating vines with copper sulphate, could spray 200 traps per hour, the contents of a spray-tank (22¾ pints) sufficing for 215 traps. The schedule was arranged for the application to be repeated on 8th July, 18th August, 20th September, and 8th and 28th October. As had been foreseen, the heavy rains in spring had destroyed many pupae, so that *D. oleae* was not very abundant, but in any case these olive trees remained untouched by the fly, whereas other properties, where measures were neglected, suffered some loss. The inclusive cost worked out at about 4½*d.* per tree, and this figure could be reduced if the necessary material were bought co-operatively. Uralite tiles were used to roof the traps.

PHILLIPS (E. F.). U.S. Bur. Ent. **The Future of Bee Disease Control.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 317–323. [Received 5th December 1921.]

The existing conditions with regard to bee disease control are reviewed, and recommendations are made for future work. If the State laws are changed, they should provide for the elimination of the police powers of the persons appointed under the law and the placing of this work under the supervision of the extension division of the agricultural colleges of the several States.

FROST (S. W.). **Late-feeding Larvae injurious to Apple in Pennsylvania, including several new injurious Species.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 324–328, 2 charts. [Received 5th December 1921.]

Recent investigations have shown that over 50 per cent. of leaf-roller injury to picked fruit is due to late-feeding species, and occurs two or three weeks prior to picking time. The insects primarily concerned in Southern Pennsylvania are *Tortrix* (*Archips*) *rosaceana*, Harr. (oblique-banded leaf-roller), *Eulia velutinana*, Wlk. (red-banded leaf-roller), and *Amorbia humerosana*, Clem. Of these, *E. velutinana*, which resembles *E. quadrifasciana*, Fern., on apples from New York State, causes most of the late injury. *Stenoma algidella*, Wlk., is also common and widely distributed in Pennsylvania. Other moths responsible for damage are *Eucosma* (*Tmetocera*) *ocellana*, Schiff. (eye-spotted bud-moth), *Platynota* (*Sparganothis*) *idaeusalis*, Wlk., *Cydia* (*Carpocapsa*) *pomonella*, Clem. (codling moth), *C.* (*Laspeyresia*) *prunivora*, Walsh (lesser apple worm), and *Recurvaria nanella*, Hb. Tests for the control of these moths show that the use of lead arsenate in the dormant and delayed dormant sprays is important. Injury can also be greatly reduced by regular and thorough spraying in the early spring. Liquid sprays have proved to be more satisfactory than dusts.

LATHROP (F. H.) & BLACK (A. B.). **Studies of** *Sanninoidea opalescens*, **Edw., in Oregon.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 328–336. [Received 5th December 1921.]

The bulk of the information contained in this paper on *Aegeria* (*Sanninoidea*) *opalescens* has already been noticed [*R. A.E.*, A, ix, 163].

Some evidence was obtained that Fuller's Earth washes have certain advantages over lime washes, and attention is drawn to the advisability of further tests of washes containing naphthaline.

STEARNS (L. A.). **Parasitism and Nicotine in the Control of the Oriental Peach Moth: A Second Report.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 336–341. [Received 5th December 1921.]

The oriental peach moth [*Cydia molesta*, Busck] is becoming increasingly abundant in Virginia; the lowest infestation recorded for 1920 was 37 per cent., and in individual trees the injury reached 81 per cent. in some cases. Damage to late peach fruit was much greater than in preceding years. A species of *Macrocentrus* is the most abundant parasite and is apparently beginning to have as many broods as its host, although up to the present no parasites have been reared from overwintering larvae. This may be one of the causes of the greater abundance of the pest in the summer of 1920. The list of parasites reared was much the same as in previous years [*R. A. E.*, A, vii, 478]. During the summer of 1920 the tests with nicotine [*R. A. E.*, A, viii, 354] were continued on a larger scale, and the results substantiate those obtained in earlier experiments. Nicotine used alone at a strength of 1–1,600 produced practically no check on the hatching of the eggs, but its effectiveness was slightly increased by the addition of a spreader composed of caseinate at the rate of 1 lb., or sea moss at the rate of 2 lb., to 50 U.S. gals. water. A 1–800 dilution of nicotine reduced the hatching by about two-thirds, and a 1–500 dilution reduced it by about three-fourths.

Experiments with a view to killing the young larvae by the addition of an arsenical to the nicotine spray were not satisfactory, probably owing to the larval habit of rejecting the first few mouthfuls of food when entering twigs or fruit.

Further observations show that the dates given in the previous report [*R. A. E.*, A, viii, 355] for the chief oviposition periods are correct within seasonal variations. The last two broods overlap to such an extent that the fixing of a date for a single spraying would be impossible.

MOZNETTE (G. F.). U.S. Bur. Ent. **Some Insect Problems confronting the Avocado Grower.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 341–344. [Received 5th December 1921.]

A brief account is given of some of the more injurious pests of avocado occurring in Florida and of remedial measures against them. The pests dealt with are *Tetranychus yothersi*, McG. (avocado red spider), and *Heliothrips hemorrhoidalis*, Bch., against which spraying with liquid lime-sulphur 1 to 50 with the addition of nicotine sulphate (40 per cent.) at the rate of 1 to 900 to the diluted lime-sulphur, or with nicotine sulphate, at the same rate, to 2 lb. of powdered lime-sulphur to 50 U.S. gals. water, is advocated; *Frankliniella cephalica*, Crawf., which may be controlled by the addition of 2 to 3 lb. of soap to every 100 U.S. gals. of the above nicotine sulphate solution; and *Trialeurodes floridensis*, Quaint. (avocado whitefly), *Chrysomphalus dictyospermi*, Morg., and *Pulvinaria (Protopulvinaria) pyriformis*, Ckll., which may be controlled with oil emulsion sprays [*R. A. E.*, A, ix, 104]. For *T. floridensis* two applications should be made, one in the spring at a strength of 1 to 80, and another in the autumn at 1 to 70.

Other pests recorded are *Anomala undulata*, Mels., *Acysta perseae*, Heid. (avocado Tingid), *Empoasca minuenda*, Ball (avocado leaf-hopper), *Pseudococcus nipae*, Mask. (coconut mealy bug), *Saissetia oleae*, Bern. (black scale), *Gracilaria perseae*, Busck (avocado leaf-roller) and *Dysdercus suturellus*, H. S.

CORY (E. N.). **Some Notes on a New and Promising Insecticide.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 4, August 1921, pp. 345-347. [Received 5th December 1921.]

An alcoholic extract of pyrethrum prepared in the form of a heavy soap has proved effective as a contact insecticide when tested against *Gargaphia solani*, Heid. (egg-plant lace-bug), at a dilution of 1 to 300; rose Aphids at 1-100 and 1-300; *Aphis rumicis*, L. (bean aphis), at 1-100; *Macrosiphum sanborni*, Gill. (chrysanthemum aphis), at from 1-100 to 1-2,000; *Malacosoma americana*, F. (tent caterpillar), at 1-600; the sawflies, *Cladius pectinicornis*, Four., and *Endelomyia rosae*, Harr., at 1-100 and 1-600; and *Pteronus ribesii*, Scop. (imported currant-worm), at from 1-500 to 1-1,000. Against *Pseudococcus citri*, Risso, and red spider, at 1-100, the results were unsatisfactory; whilst tests against the eggs of *Pieris* (*Pontia*) *rapae*, L. (imported cabbage worm) were incomplete. There is very little difference between the weaker and stronger solutions with or without the addition of 4 lb. soap to 500 U.S. gals.

This insecticide has a decidedly repellent action, and tent caterpillars refused at first to eat leaves treated with it. About 50 per cent. of those confined with treated leaves died after from 5 to 10 days, indicating a possible toxic action also.

In no instance was the foliage or most delicate flowers injured, and this insecticide is also promising as a spray for forage materials where arsenicals cannot be used.

SMITH (H. S.). **Biological Control of the Black Scale** (*Saissetia oleae*, **Bern.**) **in California.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 4, August 1921, pp. 348-350. [Received 5th December 1921.]

A brief account is given of the insectary work in connection with *Aphycus lounsburyi*, How., for the control of *Saissetia oleae*, Bern., in California [*R.A.E.*, A, ix, 339]. Since the introduction of *A. lounsburyi*, *Quaylea whittieri*, Timb., a secondary parasite of *Scutellista* and other parasites, and an undescribed species of *Eusemion*, a secondary on parasites of *Coccus hesperidum*, have increased very greatly. The effect of their presence on the practical outcome of the work is problematical.

STOCKWELL (C. W.). **The Japanese Beetle Quarantine.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 4, August 1921, pp. 350-352. [Received 5th December 1921.]

Since the discovery of the Japanese beetle [*Popillia japonica*] in 1916, it has spread over an area of approximately 85 sq. miles, 75 of which are in New Jersey and the remainder in Pennsylvania. From the results of the quarantine regulations of the past two years, it seems advisable to continue the work and prevent, if possible, its widespread distribution over the United States. The finding of the beetle in Pennsylvania has necessitated the creation of a quarantine by that State to supplement the New Jersey orders in force since 1st June 1919 [*cf. R.A.E.*, A, viii, 512]. The present regulations concerning the shipping of potted or unpotted plants from greenhouses and the

transport of farm and garden produce are briefly described. During the summer of 1920, 846 beetles were found in 2,137 baskets of maize, some of which were destined for places as distant as New York.

SASSCER (E. R.). **Important Insects collected on Imported Nursery Stock in 1920.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 353–355. [Received 5th December 1921.]

The total number of plants offered for entry into the United States during the fiscal year 1920 showed a decrease of 5,412,459 as compared with that of the previous year. The insects intercepted from October 1919 to 31st December 1920 include the following injurious pests:—*Nygmia phaeorrhoea* (brown-tail moth) on fruit seedlings and stocks, and *Acronycta rumicis*, L. (sorrel cutworm), in Mahaleb stock from France; *Emphytus cinctus*, L., on rose stocks from Holland, Great Britain and France; *Eumerus strigatus*, Fall., and *Merodon equestris*, F., on bulbs from Holland and France; *Aporia crataegi*, L., on Paradise apple stock from France; *Tortrix* (*Cacoecia*) *podana*, Scop., on *Rosa rugosa* from Holland (not known to occur in the United States); *Platyedra* (*Pectinophora*) *gossypiella*, Saund., in cotton seed from China and Japan, and in seed attached to burlap from Egypt and Holland; *Pyrausta nubilalis*, Hb. (European corn borer), in Italian broom corn; *Agriotes lineatus*, F., in Danish potatoes; *Phthorimaea operculella*, Z., in potatoes from Austria, Chili, Peru and Spain; *Cylas formicarius*, F., in sweet potatoes from Bahamas, Cuba, Mexico, Jamaica, Isle of Pines and Porto Rico; *Euscepes batatae*, Waterh. (West Indian sweet potato weevil), from Porto Rico; *Palaeopus dioscoreae*, Pierce, and *P. costicollis*, Mshl., in yams from Cuba and Jamaica; *Aleurocanthus woglumi*, Ashby (citrus blackfly), on foliage of grape-fruit, lime, mango and sapodilla from Cuba; *Aleurothrixus howardi*, Quaint., on foliage of grape-fruit from Cuba and the Isle of Pines; larvae of *Anastrepha fraterculus*, Wied., in guavas, mangos, Cuban plums and sapodillas, and what appeared to be the larvae of *A. striata*, Schin., in guavas from Cuba; *Anastrepha* sp. in mangos from Spanish Honduras; *Heilipus perseae*, Barber, in avocados from the Canal Zone; *Stenoma catenifer*, Walsh, in avocados from Spanish Honduras; what appeared to be *Conotrachelus perseae*, Barber, in avocados from Costa Rica and Mexico; and *Metamasius sericeus carbonarius*, Chev., in bananas from Spanish Honduras and Guatemala.

In addition to the above about 80 distinct species of scale-insects were found, many of which are not at present established in the United States.

The soil insects intercepted include: *Agriotes* sp. in the soil surrounding the roots of a rose from Ireland; a Curculionid larva in the soil around Japanese iris from France and in soil around *Astilbe* roots from Holland; *Forficula auricularia*, L., with evergreen shrubs, and *Otiorrhynchus sulcatus*, F., with herbaceous ornamental plants from Holland; and *Leucotermes tenuis*, Hagen, in soil around plants from Brazil.

GARMAN (P.). **The European Red Mite** (*Paratetranychus pilosus*, **Can. & Fanz.**) **in Connecticut.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 355–358, 10 figs. [Received 5th December 1921.]

The bulk of the information contained in this paper on the occurrence of *Paratetranychus pilosus*, Can. & Fanz., in Connecticut has already been noticed [*R. A.E.*, A, ix, 293].

SNAPP (O. I.). U.S. Bur. Ent. **Blister Beetle Injury to Peaches.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, p. 358. [Received 5th December 1921.]

Great damage was caused to peach trees by *Pomphopoea aenea*, Say, in Georgia in March. The beetles attacked the blossoms, eating through the calyx and devouring the pistil. The foliage was also eaten in many cases. The outbreak was checked within twelve hours by the application of lead arsenate and jarring the trees in the early morning.

HAMILTON (C. C.). **Notes on the Life History and the Control Methods of the Box Wood Leaf Midge** (*Monarthropalpus buxi*, **Labou.**)—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 359–365, 1 plate. [Received 5th December 1921.]

Since the introduction of *Monarthropalpus buxi*, Lab., probably from France or Holland, it has been reported from a number of States along the Atlantic coast and from California. In Maryland hibernation occurs as a partly grown larva, pupation beginning about May. The first adults emerged on 19th May, and the first eggs were laid on 20th May. The eggs hatch in from 12 to 18 days. The best method of controlling this midge is to entangle the adults as they emerge and before the eggs are laid. This may be effected by spraying with 1 pt. molasses to 3 pts. water three times during the period of emergence, and even more often if it rains. Of the various contact sprays tried under laboratory conditions, one containing 1 pt. syrup, 5 pts. water and Black-leaf 40 1–100 gave the best results. Black-leaf 40 and Black-leaf resinate diluted 1 : 500 also proved effective. The addition of soap at the rate of 4 lb. to 50 U.S. gals. increased the wetting properties of the spray. It is probable that under field conditions these sprays may prove effective if applied at intervals of four or five days during the period of emergence. Laboratory experiments with hydrocyanic acid gas and carbon bisulphide gave approximately the same results as obtained by Felt [*R.A.E.*, A, iii, 350]. Fumigation in the field is not advisable.

SNYDER (T. E.). U.S. Bur. Ent. **Injury to Structural Timber by Lepidopterous Larvae.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 366–369. [Received 5th December 1921.]

Pyrausta ainsliei, Heinr., is recorded as boring in the cypress pillars of a house. The Notodontid, *Cerura multiscripta*, Riley, was found in a yellow pine stake that had been treated with creosote. A species of Olethreutid is reported as injuring railway cars, and *Galleria mellonella*, L., as making grooves in a beehive of white pine wood. The damage to timber by these phytophagous but non-wood-boring Lepidopterous larvae is probably accidental. They do not feed on the woody tissue, but enter it for hibernation. Chemical treatment of the wood does not protect it from these attacks.

BURKE (H. E.). U.S. Bur. Ent. **Notes on the Carpenter Worm** (*Prionoxystus robiniae*, **Peck**) **and a New Method of Control.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 369–372. [Received 5th December 1921.]

Prionoxystus robiniae, Peck, is one of the worst pests of the native live oak (*Quercus agrifolia*) and introduced elms, such as *Ulmus campestris* and its varieties in California. Other food-plants of this

moth are white oak (*Q. lobata*), willow (*Salix lasiolepis*) and probably cottonwood (*Populus trichocarpa*). It has not been found in black locust (*Robinia*), which was the original food-plant recorded from the Eastern States. The life-cycle occupies at least three years and probably more.

The various suggestions made for the control of the pest are reviewed. The present observations indicate the use of a cage surrounding the main trunk as the most satisfactory method of eradicating *P. robiniae* from infested trees. The cage used in these experiments, which was 10 feet high, is described. The moths emerging into the cage should be collected and destroyed at least once a day. As trees that have once been infested remain attractive for some time, they should be caged for several years after all moths have emerged from the trunk.

DE ONG (E. R.). **A New Almond Aphid.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, p. 373. [Received 5th December 1921.]

Rhopalosiphum nymphaeae, L., is recorded as attacking almonds in California, apparently for the first time. Liquid applications of nicotine sulphate 1 in 1,000, with the addition of soap, have proved most effective against this Aphid.

HOLLOWAY (T. E.). **Camphor Scale in New Orleans.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, p. 373. [Received 5th December 1921.]

Camphor is apparently the preferred food-plant of *Pseudaonidia duplex*, though this scale also occurs on *Ligustrum*, rose, *Citrus*, fig and sweet olive. It is doing much damage to camphor in New Orleans, and badly infested trees are being cut down.

MORRILL (A. W.). **Cotton Boll Weevils.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 4, August 1921, pp. 373–374. [Received 5th December 1921.]

A series of cotton boll weevils collected on the West Coast of Mexico include *Anthonomus grandis* and *A. grandis thurberiae*, as well as numerous hybrids between them and races of them. Bolls are apparently preferred to squares for oviposition.

GREEN (E. E.). **On a New Genus of Coccidae from the Indian Region.**—*Ann. & Mag. Nat. Hist., London*, viii, no. 48, December 1921, pp. 639–644, 3 figs.

The Coccids described are *Cribrolecanium formicarum*, gen. et sp. n., from Ceylon, in hollow branches of *Stereospermum chelonioides*, and *C. radicicola*, sp. n., from Coimbatore, India, on roots of *Cassia* sp.

LAING (F.). **Note on** *Aleyrodes proletella*, **L.**—*Ent. Mthly. Mag., London*, lvii, 3rd Ser. vii, no. 84, December 1921, pp. 275–276.

During the autumn of 1921 *Aleurodes proletella*, L. (cabbage white-fly) was particularly abundant in Southern England. The food-plants include *Brassica* and *Chelidonium majus*. Hand-picking and burning infested leaves is probably the best means of dealing with this pest. The author is not satisfied that this species and *A. brassicae*, Wlk., are really distinct.

GOCO (A.). **Rice Pests.**—*Philippine Agric. Rev., Manila*, xiv, no. 1, 1921, pp. 57–62, 6 plates. [Received 5th December 1921.]

One of the most important pests of rice in the Philippines is the migratory locust [*Locusta migratoria*], for which the only remedy is to destroy the hoppers by driving them into pits. It is suggested that the benefit to be derived from afforestation of wild grass land, although the process would be costly, would be invaluable, as it should be a permanent remedy for locusts, and in addition would prevent floods, regulate the water supply and increase the soil fertility. Another very destructive insect is *Leptocorisa acuta* (rice bug) [see succeeding paper]. The rice stem-borer, *Schoenobius incertellus*, Wlk. (*punctellus*, Z.), causes considerable injury, the infested plants producing empty, bleached grains. A Dipterous parasite has been observed, and may be the means of holding this moth in check. It is believed that it lives in wild grasses, as it is impossible otherwise for the adult to survive and oviposit during the interval of six months before the next rice season. Clean culture will therefore do much to control it. Important leaf-folders are the Lepidoptera, *Melanitis ismene*, Cram., which feeds at the ends of folded leaves, but can only live on a few kinds of grass and is largely controlled by a Braconid parasite, and *Cnaphalocrocis medinalis*, the larva of which lives in a folded leaf and strips the upper surface so that the leaf turns white and dry. There are several parasites and predators that keep these pests in check so that the outbreaks are merely periodical. The caterpillars of *Prodenia litura*, F., and *Spodoptera mauritia*, Boisd., are usually abundant in dry seasons; they are seldom considered to be rice pests, but they sometimes cause damage to the seed beds and often lay their eggs there before migrating. These should be collected when they are laid in masses on the upper surface of the leaves. If the eggs are allowed to hatch, the seedlings should be swept with an insect net. Poisoned bran mash is useful against large larvae. Flooding, where practicable, is the easiest and probably the most effective method against them, but is not much practised. Ditching and rolling are good measures for preventing migration and for killing the larvae. Crop rotation and clean culture will also help to keep down the numbers of these cutworms.

UICHANCO (L.). **The Rice Bug,** *Leptocorisa acuta*, **Thunberg, in the Philippines.**—*Philippine Agric. Rev., Manila*, xiv, no. 1, 1921, pp. 87–125, 4 plates. [Received 5th December 1921.]

The Coreid, *Leptocorisa acuta*, Thunb. (rice bug) is widely distributed in the Philippines, and is generally the most important rice pest there. Adults are more abundant than nymphs in the fields at all seasons. At Los Baños, where the present studies were made, the bugs were first noticed in large numbers in August and were most abundant during November and December. Injury to rice in the milk stage is caused by all phases of the bug, but as rainy-season rice generally reaches this stage during November and December, it naturally suffers more than the dry-season crop. The effect of infestation is similar to that caused by *Schoenobius incertellus*, Wlk., empty grains being produced.

In the laboratory adult male insects lived an average of 62 days and adult females an average of 89. Pairing takes place from 7 to 25 days after emergence of the female. Oviposition begins from

11 to 44 days after emergence, and lasts for an average period of 65 days, the female living about 11 days after oviposition has ceased. During this period an average of 212 eggs are laid in one or two straight rows along the midrib on the upper leaf surface. The incubation period in the laboratory lasted 6 to 8 days. The nymphal stage lasts 17 to 23 days, during which time five moults occur. A list is given of wild grasses on which *L. acuta* can subsist and breed when rice is not growing.

Natural enemies of the bug are the predacious tiger beetle, *Cicindela sexpunctata*, which is an active check in India and has been recorded from the Philippines, and a Proctotrupid egg-parasite. These should be encouraged, and other beneficial insects from rice-producing countries should be imported.

In view of the seasonal appearance of *L. acuta*, a small area should be planted with rice that will reach the milk stage earlier than the adjoining rice fields; this will attract any rice bugs in the vicinity. Planting should be regulated so that the rainy-season rice will attain the milk stage, the only one attacked, at about the same time in a given locality. Certain varieties of rice, especially the bearded ones, appear to be less susceptible to attack than others, and the production of immune or less susceptible strains by breeding and selection is discussed. Several small areas planted with early rice, as described above, might be used as traps, and the plants burnt when the adults have collected on them and oviposited for some time. The adults can also be trapped by suitable baits, such as decaying meat. Elongated bags dragged across the field, as practised in India, also catch many of them. Clean culture of the fields, both during and after the rice season, is essential. During the season, wild grasses should be weeded out both from the fields and dykes. After the harvest the ground should be ploughed and planted with another crop and not allowed to become overgrown with weeds, as is frequently the case in the Philippines. Where cheap labour is available, hand collection of the eggs is a useful accessory measure.

Contact insecticides, such as kerosene emulsion, applied with a knapsack sprayer, might prove a successful remedy. This treatment need only be applied during the one month occupied by the milk stage. The nymphs usually congregate on the panicles during the cooler parts of the day; spraying should therefore be directed to that part of the plant in the early morning or late afternoon. The spray should be applied rather frequently during the month in order to catch any bugs that have fallen to the ground or escaped the previous treatment.

Meyrick (E.). **Exotic Microlepidoptera.**—ii, pt. 15, November 1921, pp. 449–480. [Published by the author, *Marlborough, Wilts.* Price 3*s.* per part.]

Of the new species described the following were bred from plants of economic importance:—Mesopotamia: *Pyroderces philocarpa*, from fallen dates; Tahiti: *Decadarchis psammaula*, on tips of coconut leaves; Ceylon: *D. pachygramma*, from coconut; British Guiana: *Blastobasis ochrobathra*, from blossoms of coconut palm; and Fiji: *Agonoxena argaula*, from leaves of coconut.

O'KANE (W. C.) & WEIGEL (C. A.). **Experiments with Contact Sprays for Leaf Miners.**—*New Hampshire Agric. Expt. Sta., Durham,* Tech. Bull. 17, February 1921, 24 pp., 1 plate. [Received 6th December 1921.]

The experiments described in this bulletin were undertaken in 1917, chiefly in connection with *Tischeria malifoliella* (apple-leaf trumpet miner). Winter is passed as a full-grown larva, which pupates with the approach of warm, spring weather, the adult moths appearing shortly afterwards. Eggs were found in Connecticut in early June, and probably appear in New Hampshire about two weeks later. They hatch in about six days, and the young caterpillar immediately begins to construct a narrow mine in the leaf; this is enlarged as the larva grows, until it has the characteristic trumpet-shape. Most of the larvae of the first generation were full-grown about 28th July; many had pupated at that time. After 8–11 days the adults began to appear, the maximum emergence being between 8th and 12th August. Oviposition begins about four days after emergence. Eggs laid by these moths hatch in 4–12 days. Growth is apparently slower for the second generation larvae than for the first—full size being reached in October, when a silken cell is spun within the leaf, in which the winter is passed.

The normal position of the larva in the mine is discussed; it was thought that this might be an important factor influencing the effect of insecticides, but, as a matter of fact, no causal relationship was discovered between position and mortality. The spraying materials used in the test were various strengths of nico-fume or Black-leaf 40, with and without soap, lime-sulphur and kerosene emulsion. The results of all the tests are shown in a series of tables. None of the sprays used was very successful against mature larvae of *T. malifoliella* in the first generation; young larvae of the second generation were destroyed by sprays of nico-fume or Black-leaf 40, 1 : 100 or 1 : 200, the mortality ranging from 73 to 37 per cent.; kerosene emulsion 1 : 8 was rather less effective. Sprays applied for the first generation gave definite residual effects on the eggs of the second generation, laid two or three weeks later, the mortality on foliage sprayed with nicotine diluted 1 : 100 or 1 : 200 ranging from 93 to 70 per cent., as compared with a normal mortality of 22 per cent. Lime-sulphur and kerosene emulsion gave no apparent residual effects.

MILES (H. W.). **Observations on the Insects of Grasses and their Relation to Cultivated Crops.**—*Ann. App. Biol., Cambridge,* viii, no. 3–4, November 1921, pp. 170–181.

Observations have been carried out in Shropshire over a period of nine months on certain insects that infest grasses, cereals and other crops, and are able, when these are not available, to subsist on other grasses and plants in the vicinity. The methods of investigation and the conditions of the soil, locality, rainfall, etc., are described, and lists are given of the insects found during the winter and those observed during the summer, with the food-plants on which each was taken.

The chief wireworms are *Agriotes obscurus* and *Athous haemorrhoidalis*, found in the greatest numbers on sandy soils with abundance of root fibre in them. Land recently broken up was badly infested. The larvae of *A. haemorrhoidalis* apparently prefer pastures and meadows to arable land. The average depth of wireworms in

the soil has been much discussed; in these investigations they were found during the winter from one to four inches below the surface, except during an attack on spring oats in April and May, when they were in the top inch of soil. Many larvae, particularly those of *Agriotes obscurus*, were observed boring upwards in the stem. Migration to lower depths as a protection against cold did not seem to occur. Larvae of *Melolontha melolontha* (*vulgaris*) were found chiefly in meadows and waste land, feeding on decaying herbage, and showing a definite preference for lighter soils. *Lema melanopa* and *Sitona lineata* were frequently found sheltering in the stems of oat grass and cocksfoot; the attack of the latter on leguminous crops is universal. The only Hymenopteron observed was an unidentified species that formed galls on couch grass.

The chief Lepidopteron was *Trachea* (*Apamea*) *secalis*, the caterpillars of which fed inside the base of the shoots of grasses and cereals from October to the beginning of June. In February, these larvae were found with those of the frit-fly (*Oscinella frit*) attacking winter wheat; they appear to feed indiscriminately on grasses or cereals in almost any situation. Larvae of *Agrotis* spp. were taken feeding on the roots of perennial rye grass, and were reported as attacking young wheat and oats in 1918. Larvae of *Triphaena pronuba* were taken on roots of golden oat grass; they seem to be general feeders on rye and meadow grasses. Larvae of *Odonestis potatoria*, which feed on various grasses, were taken on cocksfoot, but were not observed attacking any cereal crop. One species of *Tortrix* was taken on oats and tall oat grass; attempts to rear it have as yet been unsuccessful.

The Hessian fly [*Mayetiola destructor*] was found exclusively on cocksfoot, with the exception of one individual on couch grass. It has been recorded as attacking timothy grass. This species and *O. frit* are frequently accompanied by larvae of *Cecidomyia* spp., which occur in great numbers on decaying vegetation during the winter. These so-called red maggots are perhaps more saprophytic than parasitic in habit. *O. frit* was first found in mid-November on tall oat grass in a hedgerow bordering a field in which oats had been severely attacked. Later, larvae were found in perennial rye grass, golden oat, etc. Dipterous root feeders included *Pachyrrhina imperialis*, Mg., larvae of *Tipula oleracea* (leather-jackets) and an undetermined Sciarid. *P. imperialis* feeds on plants in the moister parts of the field, preferring rank growth near hedges; *T. oleracea* was very destructive to barley seedlings on newly broken-up grass fields with a moist, sandy soil and with a subsoil of clay. *Macrosiphum granarium*, on tall oat grass, singly in early autumn and again in summer, was the only Aphid found. Oats and hedgerow grasses were attacked simultaneously. The only thrips taken was *Limothrips cerealium*, Hal., which feeds through the winter in the larval stage in hollow-stemmed grasses.

In addition to these winter insects, almost all of which were present in the summer also, there were certain species noticed only in the summer.. These included *Amphimallus* (*Rhizotrogus*) *solstitialis*, taken with larvae of *Pachyrrhina imperialis* feeding around the roots of Italian rye grass in June, and *Agromyza nigripes* on wheat, oats and couch grass. The moths, *Odonestis potatoria* and *Arctia caja*, were taken feeding on grasses; the former is a general grass feeder, preferring cocksfoot; the latter frequents waste places and feeds on *Lamium* spp., cocksfoot and other grasses, and was once observed

feeding on seedling crucifers in frames, though it does not generally attack farm crops. Larvae of *Hepialus* spp. are abundant on waste places and among grass, and have been taken at the roots of rye grass and clover in April.

Natural enemies of these insects include two unidentified Hymenopterous parasites reared from *Mayetiola* (*Cecidomyia*) *destructor* and *Agromyza nigripes*. No parasites of wireworms were observed, though carnivorous ground beetles, such as *Pterostichus* (*Steropus*) *madidus* and *Nebria brevicollis*, apparently devour them, and larks and jackdaws probably destroy large numbers.

ROBERTS (A. W. R.). **On the Life History of "Wireworms" of the Genus** *Agriotes*, **Esch., with some Notes on that of** *Athous haemorrhoidalis*, **F. Part II.**—*Ann. App. Biol., Cambridge*, viii, no. 3–4, November 1921, pp. 193–215, 1 plate, 4 figs.

In this further account of the biology of *Agriotes* [*R.A.E.*, A, viii, 137], descriptions are given of the egg of *A. obscurus*, L., and of the early and late larval and also the pupal stages. In a subsequent part, it is hoped to give some description of the larva of *Agriotes sputator*, L., with notes on the early stages of *A. sobrinus*, Kies. (*acuminatus*, Steph.) and *Athous haemorrhoidalis*, F.

GARMAN (P.). **The Grass-feeding Frog-hopper or Spittle-bug** (*Philaenus lineatus*, **L.**).—*Connecticut Agric. Expt. Sta., New Haven*, Bull. 230 (Ent. Ser. 29), June 1921, pp. 327–334, 2 plates, 3 figs. [Received 7th December 1921.]

The life-history of *Philaenus lineatus*, L. (grass-feeding frog-hopper) is described from observations under wire cages in the field, the data being given in the form of tables. The stages of the insect are described and the habits of nymphs and adults discussed. The remedial measures advocated by Osborn are recommended [*R.A.E.*, A, vi, 11].

FERNALD (H. T.). **Report of the Entomologist.**—*1st Ann. Rept. Massachusetts State Dept. Agric., 1918, Boston*, Pub. Doc. 123, 1919, pp. 89–94. [Received 7th December 1921.]

Aspidiotus perniciosus (San José scale) was less abundant than usual; this was probably due to the severe winter weather rather than to the activities of the parasite, *Prospaltella perniciosi*, Tower, which has become less effective than formerly. The most serious feature of the insect situation was the continued spread of *Pyrausta nubilalis*, Hb., though injury attributed to this moth in some localities was found to be due to *Papaipema nebris*, Gn. (*nitela*, Gn.). In the spring and early summer, *Conotrachelus nenuphar*, Hbst., caused much damage to plums and apples, and the red bugs, *Heterocordylus malinus*, Reut., and *Lygidea mendax*, Reut., were serious pests, having gradually increased in numbers during the last five years. *Macrodactylus subspinosus*, F., was unusually abundant on grapes, roses and other plants. The increased number of vegetable gardens owing to the War resulted in an abundance of *Haltica* spp. (flea-beetles), *Diabrotica vittata*, F., *Leptinotarsa decemlineata*, Say, and *Lema trilineata*, Ol. Severe defoliation of beech, maple and other trees was caused by *Heterocampa guttivitta*, Wlk. (saddled prominent), some trees apparently

being injured beyond recovery. Natural enemies were the predacious beetle, *Calosoma frigidum*, Kirby, and the bug, *Podisus modestus*, Dall., which both fed on the caterpillars, as well as numerous parasites. *Anisota rubicunda*, F. (striped maple worm) was frequently abundant, but hardly ranked as a serious pest. *Pieris (Pontia) rapae*, L., was exceedingly numerous in July, and very few seemed to be parasitised. *Melittia satyriniformis*, Hb. (squash-vine borer) and *Hyphantria cunea*, Drury, were also unusually abundant.

MORSE (A. P.). **Orthoptera of Maine. Grasshoppers and Related Insects.**—*Maine Agric. Expt. Sta., Orono*, Bull. 296, March 1921, 36 pp., 25 figs. [Received 7th December 1921.]

The author here deals with the Orthoptera of Maine on lines similar to those of his manual of the Orthoptera of New England [*R. A. E.*, A, ix, 287]. The various families are enumerated, with their characteristics, mode of oviposition, characters of the young, their development and descriptions of the stages. The chief forms of injury caused by them are reviewed, with discussion of remedial measures. A key is given to the early stages of destructive species, with notes on injurious indoor species, recent immigrants into New England, a key to the families in the adult stage, and a list of 74 species occurring in Maine, with notes on their habits and abundance.

The most destructive species are *Melanoplus atlantis*, *M. femur-rubrum*, *M. bivittatus* and *Camnula pellucida*, *M. atlantis* and *C. pellucida* generally outnumbering the other species in dry situations. At least one species is added to the known fauna of the State, namely, *Arphia xanthoptera*.

SCHNEIDER-ORELLI (O.). **Reblausversuche im Kanton Zürich.** [Vine Louse Experiments in the Canton of Zurich.]—*Landw. Jahrb. der Schweiz, Lucerne*, xxxv, 1921, no. 5, pp. 481–509.

The chief aim of the experiments, begun in 1914 and described here, was to ascertain the effect of *Phylloxera*-infested material from Zurich on the varieties of American vines commonly used for reconstructing vineyards.

Swiss vines were severely attacked, while the American vines exhibited varying degrees of resistance. Their behaviour when growing free was different from that when grown in pots. Such American plants as had become infested when in pots became free from *Phylloxera* when their roots succeeded in reaching the free soil.

It is clear from these tests that some American stocks are resistant to *Phylloxera* as found in Zurich, and that there is no danger of ungrafted native vines being infested from adjacent vineyards planted with grafted vines, unless the graftings are allowed to put out roots.

The progress of infestation on old native vines was watched, and it was found that even in the seventh year of infestation the grapes were not affected to any marked degree in quality or quantity.

Numerous breeding experiments showed that the progeny of the winged Aphids all belong to the sexual generations without a proboscis, so that a direct attack on the roots by them can be excluded. As no vine-louse leaf-galls have hitherto been seen in the Zurich region, it may be assumed that the winged Aphids are unimportant there. It would appear that the aerial, alate and sexual forms and the winter

egg do not find there the conditions requisite for normal development, though the root-infesting generations can adapt themselves to the native vines and to the local weather conditions.

STELLWAAG (F.). **Die Schmarotzerwespen (Schlupwespen) als Parasiten.** [Parasitic Hymenoptera.]—*Monographien zur angew. Entomologie,* no. 6, Beiheft no. 2 to *Zeitschr. angew. Ent., Berlin,* vii, 1921, 100 pp., 37 figs. [Received 6th December 1921.]

In this discussion of Hymenopterous parasites, the systematic position and habits of the adults are considered only so far as is necessary, while development in the egg and larval stages and relation to environment are dealt with at length.

The female genitalia and the deposition of eggs form the subject of the first chapter. It is pointed out that no insect host is in any way protected against these enemies. The second chapter deals with the development of the early stages, and contains information on the physiological relation of the host to its parasite. The economic value of these Hymenoptera depends on their relation to their surroundings, and this subject is discussed in the third chapter. It may be generally accepted that parasites can flourish wherever the conditions permit the host to develop. When considering the influence of climate on geographical distribution it is necessary to distinguish between distribution areas as represented by climatic limits and specific areas where the species have been actually taken. In the United States many species of *Pteromalus* have been bred from *Lymantria dispar* and *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*), though they are scarcely known in Germany, where they should be very common. As a rule the adult parasite appears before the stage of the host which is of importance to it. Monophagous egg-parasites with a host with a one-year generation require about one year to develop within the host-egg. This is actually the case with *Anastatus bifasciatus*, Boy., the larva of which is full-grown in three weeks, but does not give rise to the adult until ten months afterwards, when emergence from the host-egg takes place. *Ageniaspis fuscicollis*, Dalm., hitherto obtained only from *Hyponomeuta* spp., has a one-year generation like its hosts, but the subspecies, *A. fuscicollis praysincola*, Silv., has three generations like its host, the olive-moth (*Prays oleellus*).

Schwangart has drawn attention to the possibility of combating vine-moths by growing the food-plants of intermediate host-insects in vine-growing districts [*R.A.E.*, A, viii, 353, 356]. This view is supported by the fact that in the Palatinate and in South Tyrol, both regions where other plants are grown close to vines, parasitism may amount to 30 per cent. instead of only 1 per cent., as in the Rhine Palatinate.

Hyperparasites play an exceedingly important part, but as they may also occur as primary parasites, or as superparasites, it is not always a simple matter to assess their value. In cases of superparasitism it appears that the larvae of Hymenopterous parasites can occur together with more compatibility than is the case when Tachinid larvae are present.

The last chapter contains the following lists of parasitic Hymenoptera: Species with aquatic hosts, Chalcids infesting plants, species bred from *Prays oleellus*, species infesting the vine-moths (*Clysia ambiguella* and *Polychrosis botrana*), *Sparganothis* (*Oenophthira*) *pilleriana*,

Nygmia phaeorrhoea (*Euproctis chrysorrhoea*), *Lymantria dispar*, and *Cydia* (*Carpocapsa*) *pomonella*. Lists of the hosts of *Apanteles glomeratus*, L., *Pimpla alternans*, Grav., and *Trichogramma* (*Pentarthron*) *semblidis*, Auriv., are also given.

PALM (B. T.). **Verslag van het Deli Proefstation over 1 Juli 1920–30 Juni 1921.** [Report of the Deli Experiment Station from 1st July 1920 to 30th June 1921.]—*Meded. Deli Proefst., Medan*, 2nd Ser., no. 21, 1921, pp. 1–43. [Received 9th December 1921.]

The new method of spraying insects infesting tobacco seed-beds with lead arsenate and soap [*R. A.E.*, A, ix, 85] is being largely used with satisfactory results, though variations in the quality of the arsenate have caused scorching in some cases. A field experiment with the emulsion resulted in a 30 per cent. reduction of the caterpillars present. A system of making nursery beds as traps was tried with good results, an average of 300 caterpillars being taken per bed. Fumigation of harvested tobacco with hydrocyanic acid gas did not come up to the high expectations formed. This was due to the appearance of green spots on the treated leaf. Investigations are being made on this subject. The species of *Phytometra* (*Plusia*) found on tobacco in Deli has been determined as *P. signata*, F.; the species occurring on tobacco in the Philippines is *P. chalcites*, F. At the end of 1920 *Lasioderma* [*serricorne*] increased in fermenting leaf on some estates; it was successfully combated by fumigation with hydrocyanic acid gas.

Cydia molesta **on the Italian Riviera.**—*Riv. Biologia, Rome*, iii, no. 4, July–August 1921, pp. 565–566.

Larvae, suspected by Dr. G. Paoli to be those of the Oriental peach moth, *Cydia* (*Laspeyresia*) *molesta*, Busck, were observed on the Italian Riviera in October 1920. Adults have since been obtained, proving the establishment of this pest all along the coast between Savona and the French frontier. At present the infestation is confined to the tips of the branches on peach trees, and as the Ligurian growers are in the habit of removing these in pruning, they do not treat the infestation seriously. If the injury extends to the fruit, there will, however, be reason to regret the substitution of American peaches for the local varieties formerly grown.

Anarsia lineatella, Z., which causes a similar injury, has also been found, but is rare and is attacked by many parasites, whereas *C. molesta* does not seem to have any in this region at present.

CALMBACH (V.). *Lyonetia clerkella*, **L.**—*Ent. Zeitschr*, xxxiv, 1921, pp. 97–98. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 94–95.)

Lyonetia clerkella, L., has two annual generations, the autumn one hibernating in the adult stage. The eggs are laid on the young leaves of *Betula alba*, *Prunus cerasus*, *Pyrus*, *Crataegus* and *Sorbus*, the first two being the preferred food-plants.

CALMBACH (V.). *Tischeria complanella*, **Hb.**—*Ent. Zeitschr.*, xxxiv, 1920, p. 70. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 94–95.)

The larvae of *Tischeria complanella*, Hb., cause disfiguring white spots on oak leaves. From three to five individuals may occur on

a leaf. They hibernate within the mines, the infested area being marked by a swelling. Pupation occurs in the mine in spring, the adult appearing in May.

JUNGMANN (—). **Physiologisch-anatomische Untersuchungen über die Einwirkung von Blausäure auf Pflanzen.** [Investigations of a physiological and anatomical Nature on the Effect of Hydrocyanic Acid Gas on Plants.]—*Ber. Deutschen botanischen Ges.*, xxxiv, p. 84. (Abstract in *Wiener landwirtsch. Ztg.*, 1921, no. 94–95.)

Studies were made of the action under a variety of conditions of different strengths of hydrocyanic acid gas on numerous plants, and the following conclusions were reached. It is better to use strong doses for a short period than weak doses for a longer one. Care must, however, be taken that the quantity of gas is not increased to a point when the pressure becomes so strong as to force it into the plant cells. Fumigation in sunlight or at high temperatures must be avoided.

HILL (G. F.). *Coptotermes raffrayi*, **Wasman (Fam. Termitidae).**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvi, pt. 2, 1921, pp. 263–267, 15 figs.

Coptotermes raffrayi, Wasm., the validity of which is not generally accepted by recent writers, is redescribed.

FERNALD (H. T.). **Applied Entomology. An Introductory Text-book of Insects in their Relations to Man.**—*New York & London*, McGraw-Hill Book Co., Inc., 1921, xiv + 386 pp., 388 figs. Price \$3·50 or 21*s*.

After deploring the chaotic condition of the teaching of Entomology in the United States, and remarking on the diverse opinions of authorities (to which he adds his own) as to subject matter, methods of presentation, or even the line of training, the author offers this work as "a classroom text for an introductory course."

Four chapters explaining the taxonomic position of insects, their structure and their development are followed by five devoted to their depredations and remedial measures for them, both natural and artificial, insecticides being treated at some length. Then follows an outline of the relationships of insects. Each of the remaining twenty-three chapters deals with a separate order, including under each an estimate of its economic importance, as well as detailed accounts of the more important pests in the United States, those of more general distribution being treated in large type, and the local or minor species in smaller type.

The Arachnida are not included, neither are there any references to literature, presumably on account of the elementary nature of the book. The sources, however, of many of the numerous excellent illustrations are given; those that are not original have been selected from well-known manuals, and this careful selection enhances the value of this up-to-date but not too technical entomological primer. Unfortunately the index does not include the insects that are illustrated but not mentioned in the text.

WATSON (J. R.). **New Thysanoptera from New York.**—*Bull. Brooklyn Ent. Soc.*, xvi, no. 3–4, June–October 1921, pp. 78–86.

The following new species are described: *Trichothrips drakei*, taken from *Phylloxera* galls on hickory and under the bark of black locust trees; *T. salicis*, on willow; *Cryptothrips adirondacks*, on willow and *Viburnum alnifolium*; and *Idolothrips fuscus*, collected from old burrows of a Cerambycid in a basswood twig.

SHERWOOD (A. H.). U.S. Bur. Ent. **Poisoned Bait as a Control for Grasshoppers.**—*S. Dakota State Coll. Agric. & Mech. Arts., Brookings*, Extens. Circ. 5, June 1918, 8 pp., 4 figs. [Received 9th December 1921.]

The measures that have been found most successful against grasshoppers in South Dakota, where the damage has been considerable during the last few years, are the use of poisoned bait, hopperdozers, spraying, and the assistance of poultry and pigs. The present circular gives Severin's formula [*R.A.E.*, A, v, 382] and instructions for the use of poisoned bait.

CRAIGHEAD (F. C.). **Hopkins' Host-selection Principle as related to certain Cerambycid Beetles.**—*Jl. Agric. Res., Washington, D.C.*, xxii, no. 4, 22nd October 1921, pp. 189–220.

With a view to securing further evidence relating to Hopkins' host-selection principle [*R.A.E.*, A, v, 210], the experiments here described were begun in 1914. The principle, as defined by Dr. Hopkins, is that "a species which breeds in two or more hosts will prefer to continue to breed in the host to which it has become adapted." Problems gradually arose demanding a broadening of the investigation until in 1918 over 100 individual experiments were in progress. Fourteen species of insects and 21 species of plants were used, involving the formation of 45 host strains. Investigations are still in progress, and several points still remain to be conclusively settled, but sufficient data have been collected to show definitely to what extent the influence of the food-plant applies to these insects. The references of previous authors to this principle are briefly reviewed, and the technique employed during the present observations is described.

The beetles used were *Xylotrechus colonus*, F., *Cyllene pictus*, Dru., *C. crinicornis*, Chev., *Callidium antennatum*, Newm., *C. janthinum*, Lec., *Hylotrupes ligneus*, F., *Neoclytus capraea*, Say, *N. erythrocephalus*, F., *Molorchus bimaculatus*, Say, *Liopus alpha*, Say, and *Hyperplatys maculatus*, Hald.

The following is part of the author's summary of the results of these experiments. In practically all species experimented with, the adults show a marked predilection for the food-plant in which they have fed as larvae, provided that they are not deterred by other factors, such as the unfavourable condition or the small quantity of the food-plant. There is considerable variation in the degree of preference for the original food-plant, as between different species. In forced transference of individual adults of a species to a new food-plant, a high mortality

of the broods generally occurs, especially in the case of eggs laid by beetles emerging from the original food-plant, in which case the mortality is often total. Half- to full-grown larvae, however, usually can be successfully transferred to a new food-plant and live and transform to adults. With some species that can be reared in a secondary (new) food-plant, by the larvae feeding one or part of one year, preference for that food-plant is shown by the resulting adults. In general, the fewer the food-plants in nature, the more marked the predilection for a particular food-plant, and vice versa. Continued breeding in a given food-plant intensifies the preference for that food-plant. The condition of the food-plant has a great influence on food-plant selection, in that every species prefers an optimum condition of the food-plant which it selects and will choose a new food-plant in the optimum condition in preference to an old food-plant in which the conditions are unfavourable. The quantity of wood at the disposal of the ovipositing adults may influence the insects in their choice between different kinds of host wood, in that, if there are many adults to a limited amount of the primary food-plant, some species will select a secondary food-plant if such is available. If this is done, however, the resulting brood is weakened. It is altogether possible that these experiments may indicate the origin of certain closely related species or varieties of insects. For instance, a species restricted to a very few plants may accidentally be forced to take a new food-plant (as actually happened in the experiments with *Cyllene* in oak). A few individuals may survive and continue the strain so that it becomes, after a time, at least physiologically different and may also develop correlated differences of colour or structure. It can hardly be said that such forms are much less distinct than in the case of the two species *Callidium antennatum* in pine and *C. janthinum* in juniper; for even though these have a slight colour distinction, and each is absolutely restricted to its own food-plants, they interbreed. On the other hand, in the different forms of *Hylotrupes ligneus*, of which the eastern form in juniper is constant in marking, the western form in redwood is quite variable, as is also the Rocky Mountain form in Douglas fir. The juniper and redwood forms interbreed, but all attempts to mate either of these with the Douglas fir form have failed. All these forms can be furnished with substitute food-plants, but in the experiments in which this has been done the original colour pattern has resulted thus far.

The grape and hickory strains of *Cyllene pictus*, although showing no colour differences, do not readily mate. Two species of *Cyllene*, *C. pictus* and *C. robiniae*, are separable only as adults, by a slight difference in the colour pattern, yet in seasonal and biological habits they are strikingly different. It is conceivable that one of the two species originated through the adoption of a new plant and continuous breeding in that plant.

That the change of food-plant in nature is not of more common occurrence is believed to be due to the high mortality of the first stage larvae in a new food-plant rather than to the absence of oviposition in the new food-plant. Although the adults show a decided predilection for a favoured food-plant in ovipositing and even, in certain species, a preference for the plants in which the larvae have fed for one or two generations, the instinct to oviposit seems to overbalance that of host selection, consequently new food-plants are frequently selected, possibly more frequently in nature than is generally realised.

EHRHORN (E. M.). **Report of the Chief Plant Inspector, June 1921.**—*Hawaiian Forester & Agric., Honolulu*, xviii, no. 8, August 1921, pp. 179–181. [Received 9th December 1921.]

The pests intercepted at Honolulu during June 1921 were: From Australia, *Prenolepis longicornis* on lotus nuts and water chestnuts. From Japan, *Chermes* sp. on pine trees. From the United States, *Anarsia lineatella* on peaches. Examples of a tree cricket, *Oecanthus longicauda*, imported by a Japanese passenger were seized and destroyed.

Fifty-ninth Annual Report of the Government Cinchona Plantations and Factory in Bengal for the Year 1920–21.—*Calcutta*, The Bengal Secretariat Book Depôt, Price 8 annas.

A new pest of cinchona, a boring beetle, identified as *Xyleborus fornicatus* (shot-hole borer of tea), is recorded on page 2 as attacking the stems. The only treatment is to cut down and burn affected trees. So far no great damage has been done.

PILLAI (R. M.). **Short Notes on the Insect Pests of Crops in Travancore.**—*Travancore Dept. Agric., Trivandrum*, 1921, 53 pp. [Received 12th December 1921.]

This paper contains a brief account of the life-histories, habits and control of numerous agricultural pests in Travancore. These include:—On rice (*Oryza sativa*), *Chapra mathias*, F., *Chilo simplex*, Butl., *Cnaphalocrocis medinalis*, Guen., *Dasychira securis*, Hb., *Hispa armigera*, Ol., *Leptispa pygmaea*, Baly, *Leptocorisa varicornis*, F., *Melanitis ismene*, Cram., *Nymphula depunctalis*, Guen., *Schoenobius incertellus* Wlk. (*bipunctifer*, Wlk.), *Scirpophaga gilviberbis*, Z., *Sesamia inferens*, Wlk., and *Spodoptera mauritia*, Boisd.

On coconuts (*Cocos nucifera*), *Adoretus lithobius*, *Aspidiotus destructor*, Sign., *Gangara thyrsis*, Mo., *Nephantis serinopa*, Meyr., *Oryctes rhinoceros*, L., *Parasa lepida*, Cram., and *Rhynchophorus ferrugineus*, F.

On ginger (*Zingiber officinalis*), *Udaspes folus*, Cram.; on castor (*Ricinus communis*), *Euproctis fraterna*, Mo., *Pericallia ricini*, F., and *Prodenia litura*, F.; on gingelly (*Sesamum indicum*), *Antigastra catalaunalis*, Dup.; on yams (*Colocasia antiquorum*), *Pericallia ricini*, F., *Prodenia litura*, F., and *Theretra oldenlandiae*, F.; on sweet potatoes (*Ipomoea batatas*), *Cylas formicarius*, F., and *Euchromia polymena*, L.

On *Citrus*, *Papilio demoleus*, L., *P. polytes*, L., *P. polymnestor*, Cram., and *Phyllocnistis citrella*, Stn.; on mango (*Mangifera indica*), *Cryptorrhynchus mangiferae*, F., *Euthalia garuda*, Mo., *Rathinda amor*, F., and *Thalassodes quadraria*, Guen.; on cashew-nut (*Anacardium occidentale*), *Cricula trifenestrata*, Helf., and *Prionomma atratum*, Gmelin; on pomegranate (*Punica granatum*), *Virachola isocrates*, F.; on figs (*Ficus carica*), *Glyphodes pyloalis*, Wlk.; on *Eugenia jambos*, *Metanastria hyrtaca*, Cram.

On egg-plants (*Solanum melongena*), *Acherontia styx*, West., *Eublemma olivacea*, Wlk., *Leucinodes orbonalis*, Gn., *Phycita clientella*, Zell., and *Urentius echinus*, Dist.; on cow-peas (*Vigna catjang*), *Epilachna dodecastigma*, Muls., *Eublemma hemirhoda*, Wlk., *Euchrysops*

cnejus, F., *Lampides baetica*, Cram., *Maruca testulalis*, Gey., *Nacoleia indicata*, F., *Nupserha bicolor*, *Psalis securis*, Hb., *Syntomis passalis*, F., and *Azazia rubricans*, Bdv.; on red gram (*Cajanus indicus*), *Exelastis atomosa*, Wlsm., and *Stauropus alternus*, Wlk.; on green gram (*Phaseolus mungo*), *Azazia rubricans*, Bdv.; on horse gram (*Dolichos biflorus*), *Nacoleia indicata*, F.; on sugar-cane (*Saccharum officinarum*), *Pyrilla perpusilla*, Wlk.

On cotton, *Sylepta derogata*, F., *Dysdercus cingulatus*, F., *Oxycarenus laetus*, Kby., *Platyedra* (*Gelechia*) *gossypiella*, Saund., and *Earias fabia*, Stoll.

MOREIRA (C.). **Uma Praga da Beringela.** [A Pest of Egg-plants.]—*Chacaras e Quintaes, S. Paulo*, xxiv, no. 5, 15th November 1921, p. 392, 1 fig.

A beetle injurious to egg-plants in the State of Paraná has been identified as *Diabrotica speciosa*, which also does much damage to water-melons, tomatos, etc. Carbolised tobacco extract, either with or without the addition of soap, is the insecticide recommended against this beetle. The formulae are: Tobacco extract (containing 7 per cent. nicotine and 1 per cent. carbolic acid) 3 qts., water 25 gals.; or tobacco extract 2-3 qts., soft soap 5-6½ lb., water 25 gals.

TROUVELOT (B.). **Observations biologiques sur l'*Habrobracon johansenni*, Vier.**—*C.R. Soc. Biol., Paris*, lxxxv, no. 35, 3rd December 1921, pp. 1022-1024.

The Braconid, *Habrobracon johansenni*, Vier., has been recently introduced into France against *Phthorimaea operculella*, Z. (potato tuber moth). Parasitism of the larva occurs during the short time between the construction of the cocoon and pupation. The adult pierces the body of the larva and sucks the juice that exudes from the puncture, as in the case of *Aphelinus mali* attacking *Eriosoma lanigerum*; but, owing to the fact that the ovipositor of the parasite has first to pierce the cocoon and that there is a considerable space between the larva and the wall of the cocoon, this is often a matter of some difficulty, and a series of punctures is often made, a sort of connecting tube being constructed by working with the ovipositor a mucilaginous substance apparently excreted from the abdomen of the parasite. This tube extends from the point at which the larval body has been pierced to the surface of the cocoon, and through it the parasite sucks the body juices of its host. The eggs are laid beside the body of the host, and the young larvae feed at its expense.

This method of parasitism and suction resembles that of the Chalcid, *Habrocytus cionicida*, parasitising the weevil, *Cionus thapsi* [*R.A.E.*, A, x, 22].

BRITTON (W. E.). **Spray now to kill European Red Mite.**—*Connecticut Agric. Expt. Sta., New Haven*, Bull. Immediate Inform. 13, 10th March 1921, 3 pp. [Received 13th December 1921.]

This information concerning the occurrence of the European red mite [*Paratetranychus pilosus*, Can. & Fanz.] in Connecticut has already been noticed [*R.A.E.*, A, ix, 293].

Light (S. F.). **Notes on Philippine Termites, II.**—*Philippine Jl. Sci., Manila*, xix, no. 1, July 1921, pp. 23-64, 6 plates, 3 figs. [Received 14th December 1921.]

In this second set of notes dealing with Philippine termites [*R. A. E.*, A, ix, 515] the following new species are described: *Kalotermes mcgregori*, *Cryptotermes cynocephalus*, *Planocryptotermes nocens*, gen. et sp. n., *Prorhinotermes luzonensis*, *P. gracilis*, and *Leucotermes philippinensis*.

Lazi (A.). **Cultivation of the Artichoke in the Roman Maremma, Italy.**—*La Nuova Agric. del Lazio, Rome*, viii, no. 188, 1st November 1920, p. 123. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 1, January 1921, p. 77.) [Received 17th December 1921.]

Artichokes in Italy are attacked by *Aphis cardui* during wet seasons, but this Aphid can be controlled by an ordinary soap solution. The leaves are attacked by *Pyrameis* (*Vanessa*) *cardui*, which, however, does not do much damage.

Bruch (C.). **Un Taladro de los Arboles del Paraíso.** [A Borer in Paradise Trees.]—*Physis, Buenos Aires*, v, no. 19, 31st October 1921, pp. 61-62.

The larva of the Cerambycid, *Elaphidion spinicorne*, Fairm., is recorded as attacking the branches of the paradise-tree (*Melia azedarach*). About 30 years ago this beetle was common in La Plata, causing damage to apple trees, but since then has almost completely disappeared.

Schugurensky (L.). **The Industrial Utilisation of the Locust.**—*Rev. Centro Estud. Agron. y Vet. Univ., Buenos Aires*, xiii, no. 99, April 1920, pp. 13-17. (Abstract in *Internat Rev. Sci. & Pract. Agric., Rome*, xii, no. 1, January 1921, pp. 25-26.) [Received 17th December 1921.]

Statistics regarding the number of locusts killed in the Argentine Republic during 1916-1918 show that an average of 96,000 metric tons of the hopper stage were killed yearly, principally in the coastal area. Of these, 30,000 metric tons were utilised by the extraction of the fats to make concentrated cattle-food and manure, bringing in a profit of nearly £20,000 at par.

Pemberton (C. E.). **The Fern Weevil Parasite. Its Life-history and Introduction to Hawaii.**—*Hawaiian Planters' Record, Honolulu*, xxv, no. 5, November 1921, pp. 196-201, 7 figs.

Further data are given on the life-history of *Ischiogonus syagrii*, a parasite of the fern weevil, *Syagrius fulvitarsis*, Pasc., in Hawaii [*R. A. E.*, A, ix, 517]. The method of introduction of the parasite and its liberation on weevil infested ferns on Mount Tantalus, behind Honolulu, is described. Parasitised weevil larvae were found within a few months, and it is therefore hoped that the parasite will become well established.

The female, having located the weevil in a fern stem apparently without difficulty, forces the ovipositor through the tissue and into

the larva, leaving a single egg on it, generally near the head. One larva frequently bears several eggs or immature larvae of the parasite at the same time. The incubation period in New South Wales during the winter lasts from six to seven days, at a temperature varying between 48° and 65° F. In the Hawaiian forest in summer this period will doubtless be much shorter. The larva lies throughout its development on the body of its host, practically inactive, imperceptibly puncturing the skin and sucking the body juices. The growth is very rapid, the host shrinking meanwhile, until it collapses entirely. The larval stage occupies from 9 to 11 days during the New South Wales winter (at 48–70° F.). When mature, the larva creeps away for a short distance in the hollow fern stem and there spins a white, silken, cylindrical cocoon. Pupation takes place several days after the cocoon is completed and lasts 18 or 19 days. The adult emerges by a circular hole cut through the wall of the fern stem. Mating may occur immediately after emergence, and oviposition has been observed four days later, at cool temperatures. The greatest number of well-developed eggs found in any female was twelve, but the adult is very hardy and long-lived; females kept in a test-tube were still alive after 91 days.

The complete life-cycle of the parasite in a New South Wales winter requires about 44 days; this in Hawaii will be somewhat less, especially in summer. The life-cycle of *S. fulvitarsis* in Hawaii occupies from 105 to 135 days. In view of the hardiness of the parasite, and its short life-cycle compared with that of its host, a rapid reduction in the numbers of the weevil can reasonably be expected, particularly as the parasite flourishes in dark, wet forests in New South Wales, and similar conditions obtain in Hawaii where the weevil has been increasing.

LEACH (B. R.) & THOMSON (J. W.). U.S. Bur. Ent. **Experiments in the Treatment of Balled Earth about the Roots of Coniferous Plants for the Control of Japanese Beetle Larvae.**—*Soil Science, Baltimore, Md.*, xii, no. 1, July 1921, pp. 43–61, 7 tables, 2 plates. [Received 19th December 1921.]

The experiments described in this paper were undertaken in 1920 as a result of quarantine measures prohibiting the shipment of soil or coniferous plants with soil about their roots from an area in New Jersey infested with *Popillia japonica* (Japanese beetle). Endeavours were made to determine the comparative value of certain gas-producing compounds against this pest and their effect on the plants concerned.

The author's conclusions as a result of the experiments are that certain compounds in solution capable of producing a gas insoluble or only slightly soluble in water are toxic to the larvae. Of these compounds carbon bisulphide, thymol and mustard oil are slightly soluble in water, and sodium sulpho-carbonate and sodium ethyl-xanthate are readily soluble. These compounds on being decomposed by organic acids yield carbon bisulphide, the killing agent. The former solutions readily kill the larvae when removed from the soil, but are ineffective against soil-balls containing larvae, as the soil only adsorbs that portion of the compound incapable of destroying the larvae. When the latter compounds are used in relatively concentrated solutions, the portion of the compound toxic to the larvae remains free in the soil.

The use of comparatively concentrated solutions of sodium sulphocarbonate and sodium ethyl-xanthate for treatment of balled earth about the roots of coniferous plants is not recommended, as they cause injury to the roots.

LEACH (B. R.). U.S. Bur. Ent. **Experiments with Hot Water in the Treatment of Balled Earth about the Roots of Plants for the Control of Japanese Beetle Larvae.**—*Soil Science, Baltimore, Md.*, xii, no. 1, July 1921, pp. 63–68, 1 fig. [Received 19th December 1921.]

Further experiments were made in 1920 for the control of the larvae of *Popillia japonica*, Newm. (green Japanese beetle) in soil about the roots of coniferous and other plants with hot water (100°–130° F.). The tests are described and prove that the roots of the plants cannot stand exposure to heated water to the same extent as the larvae. The larvae withstand an exposure of two hours in water heated to a temperature of 105° F., but succumb in 45 mins. at 110° F., in 12 mins. at 115° F., in 6–8 mins. at 120° F., in 3–4 mins. at 125° F. and in 1–2 mins. at 130° F. Soil-balls require immersion in water brought up to a temperature of 110° F. and to remain immersed at that temperature for 45 mins., and therefore this method of treatment is too slow for actual practice. Plants vary in their resistance to immersion in heated water, but even the most resistant are checked in their subsequent growth.

URBAHNS (T. D.). **The Strawberry Rootworm** (*Paria canella*).—*Monthly Bull. Cal. Dept. Agric., Sacramento*, x, no. 8, August 1921, pp. 311–313, 3 figs. [Received 19th December 1921.]

Typophorus (*Paria*) *canellus*, F. (strawberry root worm) is at present distributed over about 300 acres in California. The various stages and the character of injury are described [*R. A. E.*, A, viii, 313]. In California the adult beetles are sometimes active on warm winter days, and they appear in large numbers in March. Eggs are laid in the crowns of the strawberry plants and soil crevices from the end of March until May. The larvae appear in June and work their way to the finer roots of the plants. Pupation occurs in July, and the adults emerge at the beginning of August.

Spraying with lead arsenate (3 lb. powder to 100 U.S. gals. water) or dusting with Paris green (1 lb. to 6 lb. flour) in the latter part of August is advocated against this pest. If the beetles are present in the spring, this treatment may be applied after the spring rains and before abundant blooming occurs. When it is too late for arsenical sprays, grasshopper poison bran mash may be used.

STRONG (L. A.). **Quarantine Service. Reports for the Months of May and June 1921.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, x, no. 8, August 1921, pp. 331–335. [Received 19th December 1921.]

The pests intercepted during May and June were :—From Washington, *Plodia interpunctella* on walnut sacks. From Florida, *Lepidosaphes beckii* and *Chrysomphalus aonidum* on oranges and grapefruit; and *Aspidiotus cydoniae* on coconuts. From Maryland, *Lepidosaphes*

beckii on oranges. From Oregon and Ohio, *Myzus rosarum* on roses. From Texas, *Dialeurodes citri* on Cape jasmine. From Illinois, *Heterodera radicicola* on rose plants. From Louisiana, *Pseudococcus* sp., *P. bromeliae* and *Diaspis bromeliae* on pineapples. From South Dakota, *Lepidosaphes beckii* on grapefruit. From Mexico, *Lepidosaphes beckii* on oranges and sweet limes; *Heliothis obsoleta* in tomatos; *Plodia interpunctella* in maize; *Anastrepha ludens* in sweet limes; and *Hemichionaspis minor*, *Selenaspidus articulatus* and *Parlatoria proteus* on sour limes. From Central America, *Lepidosaphes gloveri*, *L. beckii*, *Parlatoria cinerea* and *P. pergandei* on limes; *Aspidiotus cyanophylli*, *A. cydoniae*, *Selenaspidus articulatus* and *Pseudococcus* sp. on bananas; *Tetrapriocera tridens* and *Xyleborus grenadensis* in mahogany timber; *Chrysomphalus dictyospermi* on rose plants; *Monomorium pharaonis* in soil; *Lepidosaphes beckii* and *Chrysomphalus aonidum* on oranges; and *Bruchus obtectus* in beans. From the Panama Canal Zone, *Cathartus cassiae* in maize; *Hemichionaspis minor* on coconuts; and *Lepidosaphes beckii* on lemons. From Chile, *Phthorimaea operculella* in potatoes. From Cuba, *Pseudococcus bromeliae* and *Diaspis bromeliae* on pineapples. From South America, *Trigonogenius globulum* in ivory nuts and *Tribolium* sp. in sunflower seed. From Hawaii, *Tribolium confusum* and *Bruchus obtectus* in beans; undetermined weevils in bean pods; *Chrysomphalus aonidum*, *Hemichionaspis minor*, *Ripersia palmarum*, *Hyposcoma* sp., *Monomorium floricola*, *Chionaspis inday*, *Aspidiotus lataniae*, *A. cyanophylli*, *A. cydoniae*, *Pseudococcus* sp. and undetermined Lepidopterous larvae on coconuts; *Diaspis bromeliae* and *Pseudococcus bromeliae* on pineapples and bananas; *Psammoecus desjardinsi* on bananas; *Coccus elongatus* on betel leaves; *Bruchus chinensis* and undetermined Lepidopterous larvae in botanical specimens; *Bruchus amicus*, *B. sallei* and *B. limbatus* in *Acacia* seeds; *Plodia interpunctella*, *Chrysomphalus aonidum*, *Aspidiotus lataniae* and *Phenacaspis eugeniae* on palm seed; *Pheidole megacephala*, *Psammoecus desjardinsi*, earwigs, millipedes and beetles on koa stumps [*Curcuma*]; and larvae of *Ceratitis capitata* in coffee berries. From the Philippines, *Saissetia oleae*, *Chrysomphalus rossi* and undetermined ants on orchids; and *Aspidiotus cydoniae* and *Lepidosaphes mcgregori* on coconuts. From Singapore, *Phenacaspis cockerelli*, *Aspidiotus lataniae*, *A. cyanophylli*, *Lepidosaphes* sp., and *L. mcgregori* on coconuts; and *Tribolium confusum* and *Silvanus surinamensis* in meal cake. From Australia, *Lepidosaphes beckii* on oranges. From Italy, an undetermined Lepidopterous larva in St. John's bread [*Ceratonia*]. From England, *Lepidosaphes beckii* and an undetermined Coccid on Spanish oranges.

MILLER (D.). **Life History of the New Zealand Grass-grub.**—*N.Z. Jl. Agric., Wellington*, xxiii, no. 4, 20th October 1921, pp. 199–203, 7 figs.

Odontria zealandica, White, causes considerable damage to pastures and to cereal and root crops.

The eggs are laid at the base or among the roots of the grass, and hatch in 9–11 days; the larvae feed on the roots; in cold weather they burrow about one foot beneath the surface, where they remain till August. Early in September they burrow again and pupate, the adults emerging from October to December. The beetles are nocturnal in their habits, feeding on the foliage of plants after dark,

and are often confused with *Eucolaspis brunnea*, F. (bronze beetle). There is only one generation a year. The periods of activity of the larvae are mainly from December to May, and again from August to October, the main injury being caused by the three-quarter grown individuals from March to May.

HOWARD (C. W.). **Control of Eelworm in Tomato Houses: Experiments at Lower Hutt.**—*N.Z. Jl. Agric., Wellington*, xxiii, no. 4, 20th October 1921, pp. 225–227.

During 1920–21 the author undertook experiments to test the efficacy of carbon bisulphide in controlling eelworms in tomato houses. Until recently the chief means of control has been carbolic acid. Two plots were treated with ½ gr. of carbon bisulphide, resulting in fine crops, while plants on the plot treated with carbolic acid failed entirely.

The author's conclusions are that both carbon bisulphide and carbolic acid are effective for soil treatment, but two years are required for complete eradication of eelworms. The former is the more suitable, as plants cannot be planted in soil treated with carbolic acid until 10–12 weeks after application. Spraying the surface with carbon bisulphide and saturating the soil by injecting it into holes are both effective. The house should be closed during, and for some time after, treatment. Carbon bisulphide not only does no damage, but has a fertilising effect on the plants.

SACHAROV (N. L.). **Вредители Рыбных Продуктов Астраханского Рыбного Промысла.** [Pests of Fish Products of the Astrachan Fisheries.]—**Труды Саратовского Общества Естествоиспытателей и Любителеи Естествознания.** [*Trans. Saratov Soc. Naturalists*], viii, no. 2; **Работы Волжской Биологической Станции.** [*Work of the Volga Biol. Sta.*], *Saratov*, vi, no. 1, 1921, pp. 3–39, 4 plates. [Received 11th January 1922.]

The Sepsid fly, *Piophila casei*, L., is the chief pest of fish pickled in brine, and when present in large numbers it will cause complete destruction. The various stages and life-history of this fly as occurring in Astrachan are described. Remedial measures consist chiefly in clearing away any debris in which the eggs can be laid and the protection of stored fish by freezing or complete submersion in the brine. Drying the fish in the open will also kill the larvae. Although the larvae can live on the surface of brine, especially if particles of food are present, they cannot live in closed casks containing plenty of liquid.

Of the various species of *Dermestes* occurring in Astrachan, *D. lardarius*, L., *D. frischi*, Kug., and *D. frischi* var. *sibiricus*, Er., cause great injury to air-dried and smoked fish. The life-histories and habits of these beetles are described. The predators, *Saprinus semistriatus*, Scr., *S. semipunctatus*, F., *Necrobia violacea*, L., and occasionally *Corynetes coeruleus*, De G., have been observed in connection with *Dermestes* spp., *Necrobia violacea* being particularly active, but they do not occur in sufficient abundance to be of much value in the control of the Dermestids. Sulphur fumigation is advocated as the best method of controlling these pests in dried fish.

MOKRZECKI (S. A.). **Бялата жила или тютюновия трипс** (*Thrips tabaci*, **Lindem**).—**Тютюн. Орган на Сдружението на Експортиорите и Фабрикантите на Тютюн в Блгария.** [*Tobacco: A Publication for the Furtherance of the Export and Manufacture of Tobacco in Bulgaria*], *Sofia*, ii, no. 31, 1st December 1921, pp. 1–2.

A brief account is given of the damage caused to tobacco by *Thrips tabaci*, Lind., in Bulgaria. The winged individuals appear at the beginning of June. The eggs laid by this generation hatch in from five to seven days, and the subsequent larval stage lasts about 20 days. At the beginning of July another generation of winged individuals makes its appearance. The larvae from the eggs of this generation cause serious damage to the plants in July and August, especially in dry seasons. During this period all stages of the insect may be found on the leaves. A third generation may occur, but the chief damage is caused by the larvae of the second generation.

The remedial measures advocated include the disinfection of seedlings, cultural methods with a view to increasing the vigour of the plants, and spraying with a solution of 15 lb. of tobacco refuse, 16 gals. of water and 5 lb. of common soap.

MOKRZECKI (S.). **Вѫрху Биологиата на некои нови Вредители по Розите в Бѫлгария** (*Agrilus foveicollis*, **Mars, &** *Syrista parreyssi*, **Spin.**). [On the Biology of some new Pests of Roses in Bulgaria.]—**Трудове на Бѫлг. Прир. Д-во.** [*Troodove na Blg. Prir. D-vo*], *Sofia*, ix, 1921, pp. 117–126, 4 figs. [Received 20th December 1921.]

The information contained in this paper with regard to *Agrilus foveicollis*, Mars., on roses in Bulgaria has been noticed elsewhere [*R. A. E.*, A, ix, 496; x, 41]. Other species injurious to these plants are *A. coeruleus*, Rossi, the larvae of which live under the bark, and the Cephid, *Serysta parreyssi*, Spin., a stem borer. The latter pupates in the gallery, and this stage lasts about three weeks. The sawflies appear about the 26th June and lay their eggs on the growth of the second year. The larvae appear about the middle of the summer and feed on the pith of the stem. At various distances in the galleries circular ventilation holes are cut. There is one generation a year.

FELT (E. P.). **Javanese Gall-midges.**—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 139–151, 5 figs. [Received 20th December 1921.]

Among the species described in this paper are the following new ones: *Dasyneura elatostemmae*, from petiole galls on *Elatostemma*; *Stefaniella falcaria*, from leaf galls on *Avicennia officinalis*; *S. orientalis* from a petiole gall on *Lepidagathis javanica*; *Schizomyia laporteae* from a petiole or basal leaf gall on *Laportea stimulans*; *S. nodosa* from *Moschosoma polystachum*; *S. villebrunneae* from *Villebrunnea rubescens*; *Asphondylia leeae* from a fruit gall on *Leea sambusina*; *A. litseae* from *Litsea* sp.; and *A. strobilanthi* from a gall on the aerial roots of *Strobilanthus cernuus*.

DOCTERS VAN LEEUWEN (W. M.). **Additional Notes to the Article of Mr. E. P. Felt on Javanese Gall-midges.**—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 153–159, 9 figs. [Received 20th December 1921.]

This paper describes some of the galls and deformities on the plants caused by the midges described in the preceding paper.

FELT (E. P.). **A new Javanese Gall-midge** (*Trishormomyia pandani*, **n. sp.**).—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 270–271. [Received 20th December 1921.]

Trishormomyia pandani, sp. n., is described from leaf-galls on *Pandanus nitidus*.

LEEFMANS (S.). **Biological Notes on** *Trishormomyia pandani*, **Felt, its Galls and its Parasite.**—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 271–276, 5 plates. [Received 20th December 1921.]

These notes refer to the species described above. A Chalcid parasite, which very likely attacks the pupa, is a most effective enemy of this midge; it is probably a new species.

KARNY (H. H.). **Beitraege zur malayischen Thysanopterenfauna. I–III.** [Contributions to the Malayan Thysanopterous Fauna. I–III].—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 277–291, 14 figs. [Received 20th December 1921.]

The following new species are described: *Leeuwenia seriatrix* from *Eugenia* sp.; *Dinothrips jacobsoni*; and *Mecothrips anomoceras* and *M. nomoceras* (for which this new genus is erected) found together on *Amomum coccineum*. A key is given to *Dinothrips jacobsoni* and the three other species of this genus, *D. monodon*, Karny, *D. sumatrensis*, Bagn., and *D. affinis*, Bagn., all from the Malayan region.

KARNY (H. H.). **Beitraege zur malayischen Orthopterenfauna. I–III.** [Contributions to the Malayan Orthopterous Fauna.]—*Treubia, Buitenzorg*, i, no. 4, August 1921, pp. 292–300, 2 figs. [Received 20th December 1921.]

A Tettigoniid, *Cecidophaga leeuweni*, gen. et sp. n., taken feeding on galls caused by mites on *Viburnum coriaceum*, is described. Among other notes there is one on the semi-aquatic larvae of the grasshopper, *Oxya velox*, F., which occasionally injures rice, sugar-cane and coffee. The larvae were seen on *Sagittaria sagittaefolia* in a pond.

La *Icerya purchasi* **y el** *Novius cardinalis*.—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo*, no. 2, February 1920, pp. 17–26, 14 figs. [Received 21st December 1921.]

The introduction into Uruguay from Europe of *Novius cardinalis* for the control of *Icerya purchasi* is described.

Memoria de los Trabajos realizados contra la Langosta: Invasión del 1917–1918. [Memorandum of anti-locust Work: Invasion of 1917–1918.]—*Uruguay: Minist. Indust., Defensa Agrícola, Montevideo*, 1919, 93 pp., 4 maps, 2 charts. [Received 21st December 1921.]

The anti-locust campaign of 1917–1918 was important by reason of the extension of the invaded zones rendering remedial measures necessary in all districts. The intensity of the invasions was, however, somewhat lessened by the prolonged drought, which prevented or retarded the hatching of many eggs. Reports are given of the appearance of the first swarms in various provinces, and the dates of the

first invasions in the years 1890–1917 are recorded. The general measures adopted were similar to those employed in previous campaigns [*R. A.E.*, A, vi, 556]; an account is given of the materials used and their distribution, and maps show the daily, weekly and monthly records of swarms, the direction of their flight, and location of breeding-places.

Somewhat extensive trials with *Coccobacillus acridiorum* indicate that when the virus has been sufficiently intensified by successive passages through the abdominal cavity of the locust, *Schistocerca paranensis*, its pathogenicity is raised to a point that is capable of starting a general epizootic by means of spraying. When the spray is directed to the food-plants on which the locusts are feeding, the disease begins to appear in 48 hours, cannibalism among the locusts and contamination with excrement being among the principal methods of dissemination. As the virus easily deteriorates, it should be raised to as high a strength as possible; its virulence is variable, depending upon the temperature, the age of the locust, and the freshness of the culture. Further trials are, however, considered necessary, especially against swarms in the open field.

BERTRAND (J.). **Sur des Essais de Traitement au Pyrèthre contre l'Eudémis.**—*Le Progrès Agric. & Vitic., Montpellier*, lxxvi, no. 51, 18th December 1921, pp. 595–598.

A series of experiments on a large scale to test the efficacy of pyrethrum-soap solution against the vine moth [*Polychrosis botrana*] has confirmed the results obtained by Sicard [*R. A.E.*, A, viii, 369; ix, 420, 474]. The insecticide proved effective only against the larvae of the first generation, and then only when good materials were used and the grapes thoroughly treated. Attention is called to the obvious advantage of increased production of the Languedoc pyrethrum, which is of excellent quality and much cheaper when grown locally than the imported kinds. As this insecticide is only effective against the first generation, a mortality of 100 per cent. would be necessary to obtain extermination of the moth. This, however, is too much to hope for (83·3 per cent. mortality was obtained in the present tests), and *P. botrana* will in all probability remain an important vine pest for many years.

SILVESTRI (F.). **Notizie sulla Cicala grigiastra** (*Tettigia orni*, **L.**), **sulla Cicala maggiore** (*Cicada plebeja*, **Scop.**), **sui loro Parassiti e Descrizione della loro Larva neonata e della Ninfa.** [Notes on *Tettigia orni*, on *Cicada plebeja*, and on their Parasites, with a Description of their newly-hatched Larvae and of their Nymphs.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric., Portici*, xv, 6th December 1921, pp. 191–204, 13 figs.

Tettigia orni, L., is very common in Italy. Observations made in the province of Naples show that the adults appear in early summer; oviposition begins early in July and continues until the end of August. The eggs are deposited in the lower, green twigs of oak, apple, pear, wild plum, olive, etc., and, less commonly, in the stems of herbaceous plants, such as endive, *Centaurus*, and some Umbelliferae. The twigs are thus deformed and easily break. In general, the injury is similar to that due to *Tibicen septemdecim* (periodical cicada) in North

America. The eggs are parasitised by two Hymenoptera, *Cerambicobius cicadae*, Gir., var. *minor*, n., and *Archirileya inopinata*, Silv. The life-history of the former resembles that of *Cerambicobius cicadae* parasitising *Cicada plebeja* [*R.A.E.*, A, vii, 65]; that of the latter has been dealt with under the parasites of *Oecanthus pellucens*, Scop. [*R.A.E.*, A, ix, 175].

Cicada plebeja, Scop., oviposits in the stems of herbaceous plants or in the dry or nearly dry twigs of ligneous plants. In southern Italy oviposition was chiefly seen in the stems of *Arundo pliniana*. The eggs are laid in batches of 4-12 in cells made with the ovipositor. If stems containing eggs are kept in a dry place, the larvae do not hatch. In nature hatching must take place after rain or heavy dews.

The following egg-parasites of *C. plebeja* have been observed: *Cerambicobius cicadae*, Gir., *Centrodora cicadae*, Silv., and, less frequently, *Archirileya inopinata*, Silv. The mite, *Pediculoides ventricosus*, destroys the eggs and may also become a secondary parasite attacking the larvae and pupae of the Hymenoptera. The Chalcid, *Homoporus fulviventris*, Walk., also appears to be a secondary parasite, as it attacks the larvae of *Cerambicobius*.

BONDAR (G.). **La Larve de la Noix des Palmiers.**—*Broteria, Braga*, Ser. Zool., xix, no. 3, 1st December 1921, pp. 125-135, 5 figs.

In the north of Brazil and especially in the State of Bahia, the nuts of palms, particularly those of the genus *Cocos*, are infested by the larvae of a Bruchid beetle, *Pachymerus* (*Bruchus*) *nucleorum*, F. This larva is edible and highly esteemed as a delicacy, those from the nuts of *Attalea speciosa* being the most prized. As palm oil is obtained from *Elaeis guineensis* and from a number of native palms, and as an oil factory has reported that one-third of its supplies of nuts were infested, the subject is of economic interest.

The adult, which lives for about a month, is nocturnal in habit. The female deposits from 15 to 20 eggs daily for about ten days and then dies. In June and July the egg-stage was observed to last 15-18 days. After feeding for about two and a half months, the larva pupates. Pupation lasts three weeks, and after remaining within the nut for a further week, the adult cuts its way out. The entire life-cycle lasts about six months. On the nuts of *Elaeis guineensis* the eggs are laid at the base, and the newly-hatched larvae near the sap-channels are able to reach the interior of the nut in two or three days, but of those that hatch elsewhere many die of starvation, though occasionally one succeeds in boring through the hard shell. Only one or two larvae reach the interior out of from five to ten eggs laid on a nut. The nuts are never attacked when they are still in the spathes except when the pulp has already been injured through some other cause. Those that are infested are nearly always those that have fallen. There is not much risk of infestation in buildings, though the adults that emerge from nuts already infested may attack other nuts in the store.

An Ordinance to facilitate the Control of Plant Pests and Diseases, and of Plants injurious to Live Stock. No. 38 of 1921.—[*Dar-es-Salaam*] *Tanganyika Territory*, 9th November 1921.

This ordinance is designed to give general powers under which future regulations may be published for the purposes mentioned in the title.

Section 3 provides for the control of importation and exportation of plants (including parts or products of plants) or other articles likely to spread pests or diseases. The right of search, seizure, and detention is granted as for Customs purposes.

Section 4 provides for the control within the territory under various headings, regulating and restricting movement of plants, regulating and restricting areas of cultivation, reporting occurrence and transmission of specimens of pests, regulating methods of cultivation and prescribing measures for general prevention and control, nursery inspection, certification, and sale of plants generally.

Amendment to the Cotton Ordinance, 1920 (No. 13 of 1920).—*Dar-es-Salaam, Tanganyika Territory*, 21st October 1921.

Under this amendment, power is added to the cotton ordinance of 1920 to prescribe cotton quarantine areas in which Government fumigated seed only may be planted, and to seize and destroy infested seed that is unsuitable for planting.

Ballou (H. A.). **Cotton Crops and Cotton Pests.**—*Agric. News, Barbados*, xx, no. 511, 26th November 1921, pp. 378–379.

It is said that the shortage in the American cotton crop in 1921 amounts to about 7,000,000 bales, of which some 25 per cent. is directly attributable to the boll weevil, *Anthonomus grandis*. The Egyptian crop is said to be a very poor one, *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) having been more troublesome than in any year since 1912, mainly owing to large quantities of seed cotton being held over from the previous year.

In the West Indies, where *P. gossypiella* is now present for the second season, it seems that fairly satisfactory cotton crops can be produced, if the necessary remedial measures are thoroughly carried out [*R.A.E.*, A, ix, 99, etc.]. Cotton-stainers [*Dysdercus* spp.] are serious pests, largely owing to the internal boll disease that develops in their punctures.

The severity of the attacks of *A. grandis* is greatly influenced by the weather. In Mexico, cotton can be profitably grown in certain dry areas, but in the more humid districts that encourage the development of the weevil, cotton-growing has to be abandoned. In the United States, a very severe winter followed by a hot dry summer would result in only slight infestation and a better crop, while the reverse conditions are likely to result in severe infestation.

The effect of rainfall on the crop as a result of its influence on insects requires much study in the West Indies. *P. gossypiella* also is undoubtedly greatly affected by climatic conditions in various parts of the world, and these should be more deeply studied. In India, for example, where this moth is indigenous, it has never been reported as a serious pest.

Wolcott (G. N.). U.S. Bur. Ent. **The Minor Sugar-cane Insects of Porto Rico.**—*Jl. Dept. Agric. Porto Rico, San Juan*, v, no. 2, April 1921, 46 pp., 19 figs. [Received 22nd December 1921.]

The minor sugar-cane pests of Porto Rico are reviewed, chiefly from the point of view of the connection that probably exists between some of them and the rapid spread of mosaic disease in the Island.

In dealing with those insects that are suspected of conveying the disease their possibilities in this connection are discussed. There are certain conditions that must be fulfilled by any insect that can be considered a possible vector. It must occur in abundance on sugar-cane in all parts of the Island where, and when, the disease is spreading; it must be capable of rapid dispersion; it must in all probability be possessed of mouth-parts adapted to piercing and sucking the juices of healthy cane, and it should live on that part of the cane-plant where the infection occurs, *i.e.*, on the central whorl of tender, growing leaves. The weather and topographical conditions likely to influence the occurrence both of the disease and of insects are briefly discussed.

The pests dealt with include:—Acarina: *Paratetranychus viridis*, Banks (green red spider); *Damaeus nitens*, Ewing; and *Tarsonemus spinipes*, Hirst (West Indian sugar-cane mite). Termites: *Nasutitermes* (*Eutermes*) *morio*, Latr. Orthoptera: *Scapteriscus vicinus*, Scudd. (changa); *Ellipes minuta*, Scudd. (little jumping changa); and the grasshoppers, *Schistocerca pallens*, Thunb., *Conocephalus cinereus*, Thunb., and *Neoconocephalus macropterus*, Redt., of which the two last-named, owing to their habits, suggest possibilities of mosaic transmission. Thrips, which may also be vectors. Rhynchota: *Lasiochilus divisus*, Champ. (pink leaf-sheath bug); the Fulgorids, *Delphax* (*Stenocranus*) *saccharivora*, Westw. (West Indian cane-fly), observations on which record the most striking instance of an abundance of recent secondary infection by mosaic disease where this species predominated; *Megamelus flavolineatus*, Muir (yellow-backed Fulgorid); *Liburnia teapae*, Fowl. (little black Fulgorid); *Oliarus cinereus*, sp. n. (grey Fulgorid); and *Bothriocerus venosa*, Fowl.; and the Jassids, *Agallia tenella*, Ball; *Tettigonia occatoria*, Say (coffee leaf-hopper); *T. sirena*, Stål, which has probably been responsible for the first outbreak of mosaic disease in several districts, infection being found wherever it occurs; *Kolla fuscolineella*, Fowl.; *K. similis*, Wlk., which is probably the most abundant leaf-hopper in Porto Rico—its possible connection with mosaic is discussed at length, observations showing that it possesses all the characteristics considered essential for transmission though its abundance does not coincide with the rapid spread of the disease in the inland fields; *Draeculacephala sagittifera*, Uhler (large grey sugar-cane leaf-hopper); *Spangbergiella vulnerata*, Uhler; *Deltocephalus senilis*, Uhler; *Athysanus exitiosus*, Uhler; *Thamnotettix colonus*, Uhler; *Erythroneura comes*, Say; *Scaphoideus fasciatus*, Osb.; *Cicadula sexnotata*, Fall.; two new species of *Chlorotettix*; *Balclutha osborni*, Van Duzee; and *Empoasca mali*, Le B.

Other insects include the Aphids, *Sipha flava*, Forbes (yellow sugar-cane aphis) and *Aphis setariae*, Thos. (black sugar-cane aphis); the Coccids, *Aclerda tokionis*, Ckll.; *Targionia* (*Aspidiotus*) *sacchari*, Ckll.; *Pulvinaria iceryi*, Guér.; and *Pseudococcus* spp.—though the last-named could only act as transmitters of mosaic in the event of occasional transportation by ants to fresh plants; the Lepidoptera (which are scarcely possible transmitters, as they cannot obtain the juice from uninjured cane), *Diatraea saccharalis*, F. (sugar-cane moth borer); *Opogona* sp. (bud moth); *Coleophora* sp. (case-bearer); *Laphygma frugiperda*, S. & A., which may transmit mosaic, though recently infected cane has never shown injury from this insect; *Remigia punctilaris*, Hb. (*repanda*, F.) (sugar-cane looper cutworm); and the sugar-cane skippers, *Prenes nero*, F., and *P. ares*, Feld., and various other Hesperids; the Diptera, *Calobata lasciva*, F.; *Euxesta*

thomae, L.W., and others; and the Coleoptera, *Lachnosterna* spp. (white grubs), which might easily transmit mosaic infection provided that it could be transmitted through the excrement by contact at the proper point for infection (a question that has not yet been decided); *Ligyrus tumulosus*, Burm.; *Telephanus pallidus*, Chevr. (yellow cane leaf-sheath beetle); *Epitrix cucumeris*, Harr., *E. parvula*, F., and *Systena basalis*, Duv. (tobacco flea-beetles) (which may not feed on cane although they are found upon it); *Diabrotica graminea*, Baly; *Diaprepes abbreviatus*, L. (*spengleri*, L.) (weevil root-borer); *Metamasius hemipterus*, L. (West Indian cane-stalk weevil borer); and *Xyleborus* sp. (shot-hole borer).

Coccinellids, which are predacious upon Aphids and other insects (particularly upon *Sipha flava*), include *Megilla innotata*, Muls., *Cycloneda sanguinea*, L., *Scymnus loewii*, Muls., *S. roseicollis*, Muls., *Hyperaspis connectens*, Thunb., and *H. apicalis*, Weise, and are all abundant in cane-fields in Porto Rico.

HUNTER (S. J.) & DEAN (G. A.). [**Reports of the State Entomologists.**]—*7th Bienn. Rept., Kansas Ent. Commiss, 1919–1920, Topeka*, 1921, 14 pp. [Received 22nd December 1921.]

In consequence of the recent quarantine orders of the Federal Horticultural Board, by which the importation of nearly all kinds of nursery stock has been prohibited, the work of inspection has been greatly reduced, and no pests of importance were intercepted. Insect work has chiefly been directed against San José scale [*Aspidiotus perniciosus*], surveys having been made and the infested localities noted.

Apiary inspection, carried out under the direction of J. H. Merrill, revealed the presence of more European foulbrood than has previously been known in the State. The importance of keeping watch for the appearance of this disease is emphasised.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.* [*Washington, D.C.*], i, nos. 1–7, May–November 1921, 285 pp. [multigraph]. [Received 22nd December 1921.]

These bulletins, which are issued by the U.S. Bureau of Entomology, in co-operation with the State Entomological Agencies, and are compiled by the workers of the Insect Pest Survey, form a monthly review of current entomological conditions throughout the United States. In addition, special reports of immediate interest on outbreaks of a more serious nature are issued from time to time. A digest will be published annually in the form of an Insect Pest Summary, which, with maps and statistics, will serve as a basis for approaching any economic problem.

MASON (A. C.). **A Host Plant List of Aphids in the Vicinity of the University of Florida.**—*Florida Ent., Gainesville*, v, no. 2, October 1921, pp. 21–25.

This is an alphabetical list of both cultivated and wild food-plants on which Aphids are found in Florida, with the species that are known to infest them. Though it does not present a complete record of

the Aphids of Florida, some 30 species are enumerated, while many collected could not be determined owing to the lack of mature or winged forms. At least two hitherto undescribed species were found, and there are undoubtedly many more.

CHAFFIN (J.). **Mealybugs.**—*Florida Ent., Gainesville*, v, no. 2, October 1921, pp. 31–33.

The most injurious mealybug in Florida at the present time is *Pseudococcus citri* (common citrus mealybug), found in nurseries and greenhouses and sometimes in citrus groves. The dry summer of 1921 was favourable to it, and the damage done was above the normal. *P. nipae* (coconut mealybug) is always present in the southern part of the State; in 1921, avocados, mangos, sapodillas, palms and other ornamental plants were covered with the insects. This species has fewer natural enemies than *P. citri*. *P. bromeliae* (pineapple mealybug) is becoming quite an important pest.

Owing to the large number of food-plants, rotation of crops is of very little use in control; natural enemies are Hymenopterous parasites, Coccinellids and the larvae of Syrphid and lacewing flies. A fungus was observed attacking the mealybugs, and during the rainy weather destroyed them in several groves; if this fungus can be induced to thrive in dry weather, or some parasite be found to operate until the rainy season begins, control of these pests would be assured.

GROSSENBACHER (J. G.). **It pays to control Rust Mite.**—*Florida Ent., Gainesville*, v, no. 2, October 1921, pp. 33–35.

The rust mite [*Eriophyes oleivorus*] feeds on the new, green growth of citrus trees, including leaves, fruit and twigs, and lives on the juices extracted, particularly the oil. The rusty appearance is due to oil oozing from glands that have been punctured by the mites. The effects of infestation on fruit are considerable and various, depending upon the relative earliness and intensity of the infestation and on weather conditions during the period of greatest activity. The loss caused to growers is of two kinds, the discoloration of the rind and stunting of the fruit, and the devitalising effects on the trees, which reduces the fruit crop of the following season.

BEESON (C. F. C.). **Bark-beetles of the Genus** *Sphaerotrypes*.—*Ind. Forester, Allahabad*, xlvii, no. 12, December 1921, pp. 514–518.

During recent investigations on borers of sal and other trees in natural Indian forests, it has become apparent that considerable confusion exists as to the identity of the insects concerned, and that some of the species dealt with in Stebbing's "Indian Forest Insects" [*R.A.E.*, A, iii, 154] have been wrongly named. The genus *Sphaerotrypes* has in particular been under observation, and the life-histories of these bark-beetles studied. The author has previously pointed out that *S. assamensis*, Steb., should be treated as a synonym of *S. siwalikensis*, Steb. [*R.A.E.*, A, iii, 706], and also that *S. coimbatorensis*, Steb., is a synonym of *S. globulus*, Blandf. *Chramesus globulus*, Steb., should be transferred to the genus *Sphaerotrypes*, and *S. tectus*, Winn-Samps. (*in litt.*) n. n., is proposed for it. A revision of this genus is now being made; meantime a summary of the principal conclusions is published, with a corrected synonymy and distribution of the genus as occurring in India.

The author considers that Stebbing confused individuals of *S. querci* with *Chramesus globulus*, while the gallery of a shot-hole borer assigned by Stebbing to *C. globulus* was probably that of *Crossotarsus fairmairei*. *S. macmahoni*, Steb., is considered to be a variety of *Hylesinus cingulatus*, Blandf., first found in Japan.

Stebbing considered this group of bark-beetles to be important pests, but it is rather remarkable that during the past six or seven years no cases of serious damage have been recorded, and there is no evidence indicating their primary importance. Data point to *S. siwalikensis* and *S. globulus* being secondary pests, inhabiting dead or dying trees. These bark-beetles are found in competition with other bark-breeding species, such as Longicorns and Buprestids, and are usually confined to the upper parts of the boles and the smaller branches, so that they are never able to increase to excessive numbers. Observations on *S. siwalikensis* in young sal forests have failed to yield any evidence of its ability to increase in large clear-felling areas and subsequently attack coppice growth. Stebbing's conception of five well-marked generations of *S. siwalikensis* should be replaced by two main flight periods made up of overlapping broods of inseparable generations, in which the swarm period of a brood may occupy a longer time than the minimum life-cycles of two generations.

JARVIS (E.). **Entomological Notes.**—*Queensland Agric. Jl., Brisbane,* xvi, pt. 5, November 1921, pp. 321–324, 1 plate.

Further experiments on the breeding of *Campsomeris tasmaniensis*, Sauss., are described [*R. A. E.*, A, viii, 79]. There are apparently four broods of this wasp and of *C. radula* in the year. The Tachinid *Ceromasia sphenophori* is being bred for future liberation in the sugar-cane areas infested with cane-grubs. Continued indiscriminate burning of trash greatly reduces these parasites, and it is therefore suggested that, when possible, a small patch of infested sugar-cane should be reserved in some obscure corner as a breeding ground for the fly.

TRYON (H.). **Caterpillar Plague** (*Leucania unipuncta*, **Haw.**).—*Queensland Agric. Jl., Brisbane,* xvi, pt. 5, November 1921, pp. 331–349, 3 plates, 1 fig.

This is a reprint of an article originally published in 1900.

The various stages, habits and the life-history of *Cirphis* (*Leucania*) *unipuncta*, Haw., are described. Under normal conditions this moth does not cause very serious damage, but it appears periodically in great abundance. Of its many natural enemies the following are dealt with in detail: the Ichneumonids, *Theronia rufipes*, Tryon, *Exephanes leucaniae*, Tryon, and *Paniscus* sp.; the Braconid, *Apanteles ruficrus*, Hal.; the Tachinid, *Linnaemyia nigripalpus*, Tryon; and the predacious Carabid beetle, *Calosoma australis*, Hope.

The usual remedial measures, such as rolling, the use of poison baits, ditches, etc., are described.

NICHOLLS (H. M.). **Annual Report of the Government Microbiologist.**—*Tasmania Dept. Agric & Stock, Rept. 1920–21, Hobart,* 1921, pp. 10–13, 6 figs. [Received 29th December 1921.]

Spraying with lime-sulphur solution (1 : 7) has been successfully continued for the suppression of the San José scale [*Aspidiotus perniciosus*], the numbers of which are becoming greatly reduced.

Owing to weather conditions, an outbreak of *Ceratitis capitata* (Mediterranean fruit fly) occurred on late peaches. All infested fruit was burned and the ground round the trees treated with carbon bisulphide to kill the pupae in the soil, but this method had to be abandoned owing to the extent of the area infested. The history and habits of this fly are briefly described. A successful bait is a mixture of treacle or sugar and water with lead arsenate sprayed over the trees. Unfortunately bees take this poison as well; all hives should therefore be removed as far as possible from trees thus sprayed.

Complaints have been made that lead arsenate is not effective as a spray for codling moth [*Cydia pomonella*]. The reason for this may be that no precautions are taken in Tasmania against the second generation of this pest, which always occurs in hot and dry summers, the larvae appearing at the end of January, and the adults emerging in the spring. Sprays may also be wasted by not being applied at the right time, *i.e.*, when the petals have fallen and the calyx is opening.

Pests of stored grain or chaff include *Silvanus surinamensis* (saw-toothed grain beetle), *Calandra granaria* and *C. oryzae*. Fumigation with carbon bisulphide or hydrocyanic acid gas is recommended for the first named. It is urged that barns should be constructed that can be thoroughly fumigated. Samples of prepared cereal foods have been received infested with Mediterranean flour moth [*Ephestia kühniella*].

Cabbages and allied plants were considerably damaged by *Plutella maculipennis* (*cruciferarum*) (cabbage moth), which has increased abnormally owing to a series of hot summers. The measures recommended are dusting with a mixture of soot and lime or spraying with hot water at a temperature of 120°. Paris green and lead arsenate are effective sprays, but dangerous for use on vegetables, an infusion of hellebore being a much safer remedy.

BODKIN (G. E.). **[Report of the Government Economic Biologist.]** —*Ann. Rept. Dept. Sci. & Agric. [Brit. Guiana], 1919, Georgetown*, 1920, Appx. iii, 9 pp. [Received 29th December 1921.]

The control of sugar-cane pests in British Guiana largely depends on an adequate labour supply, and there is little alteration in their status. Continued investigations are being made for the control of the moth borer [*Diatraea saccharalis*] by artificially increasing its egg-parasites.

During 1919 rice was damaged by an insect thought to be identical with or very closely allied to *Lissorhoptrus simplex*, Say (rice water weevil). *Scapteriscus vicinus*, Scud. (*didactylus*, Latr.) was thought to be damaging young rice plants, but further investigations proved the injury to be due to *Laphygma frugiperda*, S. & A., the caterpillars of which feed by night.

Pests of coconuts include *Brassolis sophorae*, L., *Sibine fusca*, Stoll, and *Castnia daedalus*, Cram.

Seeds of ornamental palms shipped to the Dutch East Indies from British Guiana were found infested with *Pachymerus* (*Caryoborus*) *nucleorum*, F.

The Coccids recorded during the year were:—*Aspidiotus palmae*, Morg. & Ckll., on palms; *A. secretus*, Ckll., on bamboo; *Morganella* (*A.*) *longispina*, Morg., on bark of papaw trees; *A. rapax*, Comst. (*camelliae*, Sign.), *Chrysomphalus apicatus*, Newst., and *Pulvinaria brevicornis*, Newst., on bark of *Avicennia nitida*; *Pseudococcus*

inquilinus, Newst., on an unknown plant; *Pulvinaria broadwayi* var. *echinopsidis*, Newst., on *Cactus*; *Pseudokermes marginatus*, Ckll., on *Nectandra* sp.; *Saissetia deformosa*, Newst., and *S. inquilina*, Newst.

New Federal Quarantine.—*Hawaiian Forester & Agriculturist, Honolulu*, xviii, no. 9, September 1921, p. 196.

Quarantine No. 51 of the 22nd July 1921, promulgated by the Federal Horticultural Board of the U.S. Department of Agriculture, came into effect on the 1st October 1921. This order is designed to prevent certain insect enemies of the mainland, new to or not heretofore widely prevalent or distributed throughout Hawaii, from gaining an entrance to the Islands, and under it the movement of sugar-cane, maize (other than shelled maize), cotton, lucerne, and avocado and papaya fruits in the natural or raw state from the United States to Hawaii by passengers and crews of coastwise ships or vessels, either as baggage or otherwise or as ships' stores, is prohibited.

BRUES (C. T.) & GLASER (R. W.). **A Symbiotic Fungus occurring in the Fat-body of** *Pulvinaria innumerabilis*, **Rath.**—*Biol. Bull., Wood's Hole, Mass.*, xl, no. 6, June 1921, pp. 299–324, 3 plates, 2 figs. [Received 29th December 1921.]

After a review of the literature on symbionts closely related to Coccids, the characteristics, morphology, etc., of yeast-like cells cultivated in artificial media from *Pulvinaria innumerabilis* are discussed. The conclusion is reached that it seems impossible to regard the universally present symbionts as harmful parasites. It is possible they may represent innocuous or indifferent parasites, and it is not easy to distinguish between these and true symbiotic or benign organisms in respect of their effect on the Coccids. It seems necessary to regard all three as steps in an evolutionary process, as harmful parasites in their first association, later as innocuous ones and finally as true symbionts. These will follow one another as the host adapts itself to withstand or nullify any ill effects of the parasite, until it is finally able to utilise the products of the symbionts to further its own metabolic processes.

HASEMAN (L.), SULLIVAN (K. C.) & MCLANE (S. R.). [**Entomological Investigations, 1919-20.**]—*Missouri Agric. Expt. Sta., Columbia*, Bull. 179, January 1921, pp. 26–30. [Received 29th December 1921.]

The various investigations undertaken during the year in connection with insect pests are briefly outlined in the section of this bulletin dealing with the activities of the Entomological Department. It is evident that different strains of wheat vary greatly as regards susceptibility to attack by the Hessian fly [*Mayetiola destructor*], though the cause of this has not yet been ascertained. The results of observations on the control of the codling moth [*Cydia pomonella*] are similar to those of the previous year [*R. A.E.*, A, ix, 239].

Miscellaneous insects dealt with during the year were: San José scale [*Aspidiotus perniciosus*], woolly aphis [*Eriosoma lanigerum*], apple leaf-hopper [*Empoasca mali*], peach tree borer [*Aegeria exitiosa*], strawberry leaf-roller [*Ancylis comptana*], tarnished plant bug [*Lygus pratensis*], grape leaf-folder [*Desmia funeralis*] and fall webworm [*Hyphantria cunea*].

The striped cucumber beetle [*Diabrotica vittata*] was effectively controlled by dusting with dry lead arsenate. One tablespoon of dry lead arsenate to 1 U.S. gal. water or 1 lb. to 50 U.S. gals. used as a spray gave equally good results. The beetles should be collected by hand in the morning in addition to the use of insecticides. The melon aphis [*Aphis gossypii*] may be controlled by spraying with nicotine sulphate, 1 pt. to 500 of water. The addition of soap increases the action of the spray.

The pests intercepted during the year included the brown-tail moth [*Nygmia phaeorrhoea*] from France.

HASEMAN (L.), SULLIVAN (K. C.) & MCBRIDE (O. C.). **[Entomological Investigations, 1920–21.]**—*Missouri Agric. Expt. Sta., Columbia*, Bull. 189, October 1921, pp. 35–38, 1 fig.

The various investigations undertaken from July 1920 to June 1921 by the Entomological Department are briefly outlined.

The work in connection with codling moth [*Cydia pomonella*] and Hessian fly [*Mayetiola destructor*] has been continued along the lines adopted in previous years. Sprays at low to moderate pressure give better results in codling moth control than at high pressure. Several strengths of arsenicals have been tried against the striped cucumber beetle [*Diabrotica vittata*], melon aphis [*Aphis gossypii*] squash stink bug [*Anasa tristis*] and squash-vine borer [*Melittia satyriniformis*], but although they appeared effective on patches in gardens they did not control these pests in large commercial areas.

The infestation of chinch bug [*Blissus leucopterus*] has been reduced by systematic cleaning up and burning over waste places during the winter. The San José scale [*Aspidiotus perniciosus*] is still the chief pest of nursery stock and can apparently only be controlled by dipping the stock in a solution of 1 gal. miscible oil to 12 or 15 gals. water. This treatment reduced the scale by 99–100 per cent.

HASEMAN (L.). **The Tarnished Plant-bug and its Injury to Nursery Stock.**—*Missouri Agric. Expt. Sta., Columbia*, Res. Bull. 29, July 1918, 26 pp., 9 figs. [Received 29th December 1921.]

In Missouri nursery stock is considerably damaged by *Lygus pratensis*, L. (tarnished plant-bug). Eggs are deposited in the blossoms of various plants, preference being given to *Erigeron canadensis*. They hatch in 7–10 days and pass through five nymphal stages, which are fully described. The winter is passed in the adult stage, and those that survive cause the worst damage by feeding on the opening buds and growing tips of plants in the early spring. Any later injury is of less importance. The date of appearance of the adults and the plants attacked vary greatly each year. This pest is destructive to various crops all the summer, but to nursery stock only during a few weeks in spring. Peach, pear and cherry are the most severely attacked.

Clean culture is the chief remedial measure, as the bug does not breed on the trees and crops that it damages. Weeds and other plants on which it breeds and hibernates should be destroyed during the end of the summer and early autumn. Trap crops, such as clover, wheat, rye and grasses, planted in the nursery attract the pest in early spring. Other effective measures are driving the bugs when they are most numerous, and the use of a wheeled machine armed with

sticky shields. Pruning and the use of insecticides are not recommended, as any sprays strong enough to kill the bugs would injure the plants.

DE LA BARREDA (L.). **Un Hemiptero en los Pinos.** [A Hemipteron on Pines.]—*Rev. Agric., Mexico, D.F.*, ii, no. 9, 1st July 1918, pp. 376–378, 2 figs. [Received 29th December 1921.]

Pines in the forest of Chapultepec are infested by an unidentified Aphid. The first sign of injury is the withering of the needles; this is followed by that of the terminal branches, and finally the tree dies. Experiments with various insecticides showed that the best remedy was spraying with a 1 per cent. solution of alcohol in water, repeated every eight days until the cottony secretion that reveals the presence of the insect no longer reappears.

DE LA BARREDA (L.). **El Cascalote atacado por dos** *Bruchus*. [*Caesalpinia coriaria* attacked by two Bruchids.]—*Rev. Agric., Mexico, D.F.*, iv, no. 5–6, 1st May 1919, pp. 256–259, 1 plate. [Received 29th December 1921.]

In June 1918 stored pods and seeds of *Caesalpinia coriaria*, which are used in tanning, were badly infested by two species of Bruchid beetles. Fumigation with carbon bisulphide at the rate of 40 grammes per cubic metre of space is the remedy advised The treatment may be prolonged up to 48 hours without damage.

MADARIAGA (A.). **Plagas y Enfermedades del Maiz.** [Pests and Diseases of Maize.]—*Rev. Agric., Mexico, D.F.*, iv, no. 9–10, 1st July 1919, pp. 449–455. [Received 29th December 1921.]

The pests of maize in Mexico include: *Tetranychus bimaculatus* and other mites; *Aphis maidis*; *Heliothis obsoleta*, which has 3–5 generations a year; *Diatraea saccharalis*; *Macrodactylus mexicanus* and *M. silaonus*; *Diabrotica longicornis*; *Lachnosterna* spp., the larval stage of which may last three years; and grasshoppers and locusts belonging to the genera *Melanoplus*, *Brachystola* and *Schistocerca*. The measures advocated against these are those commonly employed.

Stored maize is attacked by various Lepidoptera, including *Sitotroga* (*Gelechia*) *cerealella*, and by several beetles, especially weevils of the genus *Calandra*. Fumigation with carbon bisulphide is recommended against these.

COOLEY (R. A.). **Late Developments in Arsenical Insecticides.**—*Better Fruit*, xv, 1920, no. 5, pp. 9, 10, 16. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 5, October 1921, p. 455.) [Received 4th January 1922.]

Crude white arsenic obtained from Montana smelters at a low cost has given quite satisfactory results when used in grasshopper control. It was also found that it could be used as a spray on potatoes for the control of the potato beetle [*Leptinotarsa decemlineata*] without injuring the foliage, a result perhaps due in part to the short period of time that the arsenic was in the water, since, when sprayed on the plants, the water evaporated very quickly. The first experiment was with the refined white arsenic, and later the crude product was applied as a dust, with even better results, probably owing to its fineness.

SMITH (K. M.). **The Bionomics of the Carrot Fly** (*Psila rosae*, **Fab.**). **Some Further Methods of Control.**—*Fruit-Grower, Fruiterer, Florist & Mkt. Gdnr., London*, lii, no. 1359, 15th December 1921, pp. 955–958, and no. 1360, 22nd December 1921, pp. 993–994, 18 figs.

Some account of *Psila rosae*, F. (carrot fly) and the injuries it causes has been given in a preliminary paper [*R. A. E.*, A, x, 49]. The eggs are exceedingly small and difficult to find, being hidden in the soil close to the plant, sometimes singly, sometimes in clusters. A female dissected 16 days after emergence was found to contain 97 ripe eggs and many unripe ones. The incubation period is about 12–19 days. The young larva bores its way into the carrot, and generally feeds with the posterior end of the body protuding from the root. The larval period is very variable, depending largely on weather conditions; normally it lasts about four weeks, but this may be prolonged to six or seven weeks in cold weather. When carrots are stored in a warm place, the larvae will continue to feed and develop throughout the winter months. Pupae are found in the soil close to the carrot, sometimes adhering to it. The pupal period varies even more than the larval, sometimes lasting about a month and sometimes continuing throughout the winter. The adult fly is described. Similar species, which are frequently confused with *P. rosae*, are *P. nigricornis* and *P. unisetа*; the characters differentiating these species are described.

Male flies under observation began to die after 14–17 days; females lived from 38 to 45 days. If given an unlimited supply of sugar and water, the flies would feed until the abdomen burst; this might be used as a remedial measure in the same manner as the poison bait used against the onion fly, *Hylemyia antiqua*. There are two generations of *P. rosae* in a season, but neither is complete, as many pupae of the first generation overwinter. Larvae of the second generation pupate about the end of September and emerge in the following spring. The seasonal incidence varies considerably; a table records the observations in the field in 1920. While hibernation usually occurs in the pupal stage, there is reason to believe that the adults of the second generation may also hibernate.

The question of wild food-plants of *P. rosae* is an important one; numbers of them have been found on Umbelliferous plants, and in May many were taken on cow parsley (*Anthriscus sylvestris*) before carrots were above ground. It is not yet known what happens to the flies emerging early in May from overwintering pupae, or on what they or their larvae feed between that date and the first appearance of the carrots. It is possible that they subsist on Umbelliferous weeds. On the other hand, the closely allied species, *P. nigricornis* and *P. uniseta*, and also *P. rosae*, have been found upon sallow, oak and hazel in woods, etc., though they may have been only sheltering on these.

Three Braconid parasites have been bred from pupae of *P. rosae*. One of these has been identified as *Aphaereta cephalotes*, the others are two new species of *Dacnusa*. Experiments in control, on the lines indicated in the earlier paper [*loc. cit.*] were planned for the season of 1921. The trials are outlined, but unfortunately no results could be obtained, owing to the entire absence of *P. rosae* in the localities chosen for the experiments.

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Goodrich (E. S.). **Note on the Hymenoptera parasitic on Beetles infesting Grain.**—*Repts. Grain Pests (War) Committee, Royal Society, London*, no. 9, December 1921, pp. 5–7.

In discussing the parasitism of grain pests by *Chaetospila elegans*, Westw., and *Lariophagus distinguendus*, Först., it is pointed out that the most dangerous pests, namely, *Rhizopertha dominica*, F., *Calandra oryzae*, L., and *C. granaria*, L., are fortunately those most commonly attacked, generally in the larval, and occasionally in the pupal, stage. The parasite absorbs the body contents of its host, which becomes reduced to a brown and shrivelled skin; the Chalcid then pupates and eventually emerges as an adult from the grain. The Acarid that causes the death of so many of the Hymenopterous parasites [*R.A.E.*, A, ix, 417], has now been identified as *Pediculoides ventricosus*. There is evidently some factor that keeps this Acarid in check, as otherwise it would exterminate both the weevils and their parasites. Although these Hymenoptera are of valuable assistance in reducing the numbers of the weevils, yet the results of the present investigation do not indicate that they could successfully be used in practice to control grain pests.

Waterston (J.). **Report on Parasitic Hymenoptera, bred from Pests of Stored Grain.**—*Repts. Grain Pests (War) Committee, Royal Society, London*, no. 9, December 1921, pp. 8–32, 15 figs.

A list is given, compiled from many sources, of Hymenopterous parasites that have been recorded from grain pests. During the present enquiry, several hundred Pteromalids and Bethylids were examined.

As a result of this examination and of previous records, the species bred from grain pests have been divided into three classes, viz., those that have been erroneously recorded, those that were unrecognisable or not represented in the material examined, and species actually determined. The last-named include the Pteromalids, *Bruchobius laticeps*, Ashm., *Aplastomorpha vandinei*, Tucker, *Lariophagus distinguendus*, Först. (*calandrae*, How), *L. puncticollis*, Möll., and *L. utibilis*, Tucker; the Spalangiid, *Chaetospila elegans*, Westw., and the Bethylids, *Rhabdepyris zeae*, Turn. & Watrst., sp. n., and two undetermined species of *Cephalonomia*. Descriptive notes and figures of these species are given, as well as a key to facilitate recognition of Pteromalids bred from *Bruchus*, *Calandra* and *Sitodrepa* infesting grain.

Durrant (J. H.). **Insects associated with Grain, &c.**—*Repts. Grain Pests (War) Committee, Royal Society, London*, no. 9, December 1921, pp. 33–52.

From the examination of more than 500 samples of grain, a list is given comprising 36 Coleoptera, 8 Lepidoptera and 10 Hymenoptera, found in stored cereals, pulse, etc. These include pests, scavengers, parasites and predators, and lists are given of the samples in which they occurred and their geographical distribution.

Calandra oryzae, L., *C. granaria*, L., *Rhizopertha dominica*, F., and *Trogoderma khapra*, Arr., are known to be really serious pests of grain, the first-named causing more loss than all the other grain pests combined. *Tribolium castaneum*, Hbst., and *T. confusum*, Duv.,

Silvanus surinamensis, L., and *Latheticus oryzae*, Waterh., generally destroy grain only when it has been injured by primary pests, but they are undoubtedly real pests of flour, biscuits and other products. It is thought that *T. castaneum* (*ferrugineum*), which occurred in great numbers, can be induced to attack grain. *T. confusum* was very rare in the samples examined. *Trogoderma khapra*, in the form of remains of the larval stage, was found in wheat samples from Queensland, but whether the species was established there or only infesting the ship is doubtful. This is the species that has lately been causing much damage to malt in England [*R.A.E.*, A, ix, 143, 431; x, 32]. *Tenebroides mauritanicus*, L., has frequently been recorded as injurious, but in the present investigations it was observed to be merely predacious. Both beetle and larva devoured *T. castaneum*, *S. surinamensis* and other beetles, as well as larvae and pupae of *Ephestia kühniella*, Z. If placed in flour in a glass bottle, the larva makes long burrows through the flour, evidently searching for insect prey. *Cathartus quadricollis*, Guér., *Echocerus maxillosus*, F., and *Anthicus elegans*, Lea, are recorded, apparently for the first time in this country. Of *Tinea granella*, L., formerly reputed to be a serious grain pest, only a single individual was bred.

A list is given of the Hymenoptera examined, with notes on their origin, and the Lepidoptera and Coleoptera with which they were associated. The species listed are the same as those recorded in the preceding paper.

Bagnall (R. S.) *Dendrothrips ornatus* **(Jabl.), a Species of Thysanoptera new to the British Fauna.**—*Ent. Mthly. Mag., London*, lviii, 3rd Ser. viii, no 85, January 1922, pp. 18–19.

Dendrothrips ornatus, Jabl., is recorded from Scotland on limes in company with *Bagnallia calcarata*, Uzel.

A[shby] (S. F.). **Some Recent Observations on Red Ring Disease of the Coconut.**—*Agric. News, Barbados*, xx, no. 508, 15th October 1921, p. 334, & no. 509, 29th October 1921, pp. 350–351.

Further experiments have been carried out in Grenada on the red-ring disease of coconuts, transmitted by the Nematode, *Aphelenchus cocophilus*, Cobb [*R.A.E.*, A, viii, 66, 411]. Tests showed that the larvae all died after fifteen hours' desiccation, but it is thought that the eggs may prove more resistant. The larvae are active in drops of water, in which they progress at the rate of about 5 ft. an hour; they will ascend a vertical moist surface either with or without the attraction of bait, and remain active in fresh water for at least a week. In sea-water, or in a 2½ per cent. solution of sodium chloride, they were active for three days, but many were dead after five days. A 5 per cent. solution allowed sluggish movement for four days, and in 10 per cent. salt they were dead within an hour. In a 10 per cent. solution of sodium bicarbonate active movement occurred for two days.

Various experiments in inoculation of healthy palms with diseased tissue are described. The sensitiveness of the larva to desiccation is an important factor in limiting the chances of infestation, as it is improbable that living larvae would be present in fragments of tissue dry enough to be blown up by wind. Scavenging insects or palm weevils are far more likely to be the means of transmitting living Nematodes or eggs from dead or dying trees, and such trees should

therefore be destroyed without delay. Larvae can also be readily carried in rain-wash. As this Nematode is capable of penetrating through wounds deep into the husk of nearly mature nuts, those dropped from diseased trees, or lying on wet soil in fields where the disease is present, should not be used for seed unless the husks have been thoroughly dried.

The fact that this Nematode is dependent on a very high degree of humidity for its motility and is very sensitive to desiccation indicates that wide spacing, good drainage and freedom from heavy undergrowth are important factors in the prevention of red-ring disease during the susceptible period of growth, which is generally between the fourth and tenth years. Experiments are now in progress on the value of salt as a preventive of infestation and on the effects of banding trees with a mixture of tar and tallow.

IRONSIDE (F.). **Paraffin and the Carrot Fly** (*Psila rosae*).—*Gdnrs. Chron., London,* lxx, no. 1819, 5th November 1921, p. 237.

An infestation of carrots by the carrot fly, *Psila rosae*, was successfully checked by the application of paraffin mixed with wood ash at the rate of one quart to the bushel. As the ground was very dry it was thoroughly watered with a hose, and two days later the wood ash was spread thinly over the bed. The hose was again applied so as to wash the paraffin down to the roots of the carrots. A few days later all grubs around the roots examined were dead. For an area of 25 yds. by 12 yds. two bushels of the prepared wood ash were used.

JENSEN (H.). **Ziekten van de Tabak in de Vorstenlanden.** [Pests and Diseases of Tobacco in the Vorstenlanden District, Java.]—*Meded. Proefst. Vorstenlandsche Tabak, Klaten, Java,* xl, 1921, xii + 171 pp., 36 figs., 59 plates. Also *Leiden*, N.V. Boekhandel en Drukkerij voorheen E. J. Brill.

Each disease or pest of tobacco forms the subject of a separate chapter of this volume. The agent concerned and the measures against it are dealt with, the vernacular names and references to literature being given in each case.

The preparation and use of sprays and other means employed in protecting the plants and harvested tobacco are described in the last section.

The following is a list of the insect pests concerned: *Lasioderma serricorne*, F.; *Opatrum* (*Gonocephalum*) sp.; *Eutochia lateralis*, Boh. (*Holaniara picescens*, Fairm.); *Anomala* (*Euchlora*) *viridis*, F.; *Heliothis assulta*, Gn.; *Prodenia litura*, F.; *Phytometra* (*Plusia*) *signata*, F.; *Acherontia lachesis*, F., and *A. styx*, Westw.; *Phthorimaea* (*Gnorimoschema*) *heliopa*, Low.; *Setomorpha margalaestriata*, Keuch.; the fire ant, *Solenopsis geminata*, F.; the gramang ant, *Plagiolepis longipes*, Jerd.; locusts; the mole-crickets, *Gryllotalpa hirsuta*, Burm., and *G. africana*, Beauv.; the cricket, *Brachytrypes achatinus*, Stoll; the bugs, *Nezara viridula*, L., and *Gallobelicus nicotianae*, Kon.; Aphids; thrips; and the Nematode, *Heterodera radicicola*, Greef.

There is also a brief section on *Botys marginalis*, Moore, and *Agrotis* sp., occurring on tobacco in Deli (Sumatra) and Djember (Java), but not yet noticed in the Vorstenlanden district.

SIDENIUS (E.). **Palmoliezeep voor Bibitbespuiting.** [Palm Oil Soap for Spraying [Tobacco] Seedlings.]—*Deli Proefst., Medan,* Vlugschr. 11, November 1921, 2 pp.

Experiments have shown that a yellow soft soap made from palm oil on the East coast of Sumatra is a good substitute for ordinary soft soap in sprays and has the advantage of being much cheaper. Purchasers are advised to see that samples dissolve readily in boiling water, that the fatty acid content does not fall below 55 per cent., that the water content does not exceed 45 per cent., and that the soap reacts neutrally to phenolphthalein.

D'ANGREMOND (A.). **Jaarverslag 1 Mei 1919–30 April 1920.** [Annual Report of the Vorstenland Tobacco Experiment Station from 1st May 1919 to 30th April 1920.]—*Meded. Proefst. Vorst. Tabak, Klaten, Java,* xlii, 1920, pp. 3–13. [Received 2nd January 1922.]

In some cases tobacco was infested by *Phthorimaea* (*Gnorimoschema*) *heliopa,* Low., just after it had been planted out. Early in the year the larvae were observed in the seedlings that sometimes occur along the drying sheds, and the destruction of such plants is advised.

MORSTATT (H.). **Zur ständischen Gliederung und Ernährungsbiologie der Termiten.** [On the Differentiation of the Typical Forms of Termites and their Feeding Habits.]—*Ent. Mitt., Berlin,* xi, no. 1, 4th January 1922, pp. 9–16.

The title of this paper indicates the character of its contents.

Nuevo Método para combatir á los Taladros de los Durazneros. [A New Remedy for *Aegeria exitiosa,* Say.]—*Gaceta Rural, Buenos Aires,* xv, no. 172, November 1921, p. 453.

Aegeria (*Sanninoidea*) *exitiosa,* Say (peach-tree borer) has been for the last few years one of the worst pests of peach trees in Argentina. The work of Blakeslie respecting remedies for this pest in the United States is reviewed [*R.A.E.*, A, iii, 352], and his treatment with paradichlorobenzene [*R.A.E.*, A, viii, 189] is advocated as the most successful method of dealing with it.

HOWARD (A.) & HOWARD (G. L. C.). **The Agricultural Development of Baluchistan. The Protection of Fruit Trees from Green-fly.**—*Agric. Res. Inst., Pusa, Calcutta,* Bull. 119, 1921, pp. 22–24.

Irrigation experiments in the Quetta valley here described showed that fruit trees are rendered liable to attack by Aphids as a result of over-irrigation during the preceding autumn, winter and early spring, which cuts off the air supply needed by the roots when new growth begins in March. The Aphids do not spread from affected trees to others that have not been over-watered, although they may be only a few feet apart.

In order to avoid infestation by Aphids, care should therefore be taken to reduce autumn and winter irrigation to a minimum, to cultivate round the trees after the last watering in October, and again deeply before the buds break in March. Where fruit trees occur in flower-borders or areas under other crops, as much land as possible round the trees should be protected from surface flooding by small embankments.

Hutson (J. C.). **Progress Report of the Entomologist, July–September, 1921.**—*Trop. Agric., Peradenyia*, lvii, no. 5, November 1921, pp. 319–320.

Special investigations are in progress on *Natada nararia* (fringed nettle-grub), *Spodoptera mauritia* (paddy stem-borer), *Nephantis serinopa* (coconut caterpillar), *Aularches militaris* (spotted locust) and *Calotermes* spp. Other pests reported during the quarter included: *Hypsipyla robusta* (toon shoot-borer); *Ceroplastodes cajani*, attacking *Tephrosia candida*; and *Taragama dorsalis* and *Terastia meticulosalis* on dadap [*Erythrina*].

As the result of an outbreak of *Nephantis serinopa* on coconuts, this moth has recently been declared a pest by an Ordinance in Council. The remedial measures scheduled under the Regulations are the use of various light traps.

Parker (T.). **Red Spider: A Note on its Control.**—*Nurseryman & Seedsman, London*, no. 1426, 29th December 1921, pp. 9–10.

Various experiments carried out for the control of red spider under glass are here described. On carnations spraying is very unsatisfactory owing to the waxy bloom, which causes the spray fluid to collect in globules at the axils of the leaf. Dipping gives better results, though it can only be applied to potted plants that are not in bloom, and must be repeated once or twice. Liver of sulphur and petroleum emulsion, containing 16 per cent. potassium sulphide and 34 per cent. petroleum (1 : 40), did no damage to the plants, though it caused some staining of the foliage. Fumigation with either tetra- or pentachlorethane produced uncertain results, without harming the carnations.

On cucumbers a spray containing 5 per cent. nicotine sulphate (40 per cent.), 50 per cent. petroleum and 30 per cent. potash fish oil soap was quite effective in controlling these mites. The plants were sprayed with the fluid at 1–160 dilution in the evening, and syringed with clear water the following morning. This treatment was repeated once or twice.

Diffloth (P.). **Les Arbres d'Ornement et leurs Ennemis.**—*Vie Agric. et Rur., Paris*, xix, no. 53, 31st December 1921, pp. 467–471, 5 figs.

This paper gives some account of the commoner North American insects infesting shade and ornamental trees.

Ravaz (L.). **Le Ver Blanc dans les Pépinières.**—*Progrès Agric. et Vitic., Montpellier*, lxxvii, no. 1, 1st January 1922, pp. 7–8.

Lamellicorn larvae appear periodically and damage vine plants in nurseries or young plantations, making ringed or spiral incisions on the main roots. Areas so infested should not be selected for nurseries. The remedies suggested are the disinfection of the ground with carbon bisulphide or potassium sulpho-carbonate before establishing a plantation. These substances are, however, expensive. Trap crops, such as potatoes, which are preferred to vines, might also be planted between the rows.

LICHTENSTEIN (J. L.). **Le Bombyx Cul-doré ou Cul-brun** (*Nygmia phaeorrhoea = Euproctis chrysorrhoea*).—*Progrès Agric. et Vitic., Montpellier*, lxxvii, no. 1, 1st January 1922, pp. 12–18, 1 plate.

The food-plants of *Nygmia phaeorrhoea* (brown-tail moth) in France are chiefly Rosaceae, including fruit trees, such as apple, pear and plum, and sometimes cherries. Hawthorn and blackthorn hedges are also chosen for oviposition. Among forest trees, oaks are the first attacked, but many other deciduous trees become infested, such as hazel, beech, elm, lime, chestnut, etc. In the south of France shrubs and evergreen oak are also attacked. Conifers are immune. The life-history of this moth and the damage it does are described. In France it never becomes of great importance, its activities being largely limited by parasites, while the numbers can easily be reduced by destroying the nests in winter. The destruction of these by 20th February is required by law.

McCOLLOCH (J. W.). **Summer Control of the Chinch Bug.**—*Kansas Agric. Expt. Sta., Manhattan*, Circ. 87, May 1921, 8 pp., 3 figs. [Received 4th January 1922.]

The chinch bug [*Blissus leucopterus*, Say] appeared in destructive numbers in Kansas in 1920 after six years absence—wheat and maize being attacked. Practically no mortality occurred during hibernation in 1920–21 owing to the mild and dry winter, and a serious outbreak was therefore expected in 1921. The summer remedial measures, such as dust and oil barriers, are described [*R. A.E.*, A, ii, 226].

PARKER (J. R.), STRAND (A. L.) & SEAMANS (H. L.). **Pale Western Cutworm** (*Porosagrotis orthogonia*, **Morr.**).—*Jl. Agric. Res., Washington, D.C.*, xxii, no. 6, 5th November 1921, pp. 289–321, 4 plates.

Porosagrotis orthogonia, Morr., is considered to be the most dangerous of all the western grain cutworms, and caused serious injury in Montana from 1915 to 1920. The history and distribution of this moth are described. The seasonal history is recorded for 1919 and 1920 [*R.A.E.*, A, iv, 346], and the number of eggs and the incubation period are shown in tables.

One of the reasons that make *P. orthogonia* such a dangerous pest is the unusually long period of larval feeding, which extends until mid-June, and has even been observed until 10th July. The cutworm almost invariably attacks the plant below the surface of the ground, and, contrary to former records, the authors have never known it to feed or even to appear above ground, except in rare instances immediately following rain. Migration seldom occurs, even when the food supply becomes exhausted. When this happens, the larva simply remains where it is, perhaps for several weeks, without feeding or growing to any extent. Cases have occurred of fields that had been entirely destroyed being resown after a week or two, and the new grain as it came up being again destroyed by the cutworms that had remained in the field since the winter wheat had been destroyed some three weeks previously.

The usual food-plants in Montana are winter and spring wheat, oats, barley, rye, flax and lucerne. In the insectary, larvae have fed

and grown rapidly on dandelion. Flax, beets, onions, cabbages and carrots have also been recorded as food-plants.

In trials with light-traps, from 12th August to 2nd September (*i.e.*, the whole flight season), 82,488 moths were caught, as many as 4,000 being captured in one night; this method, however, is not practicable for prairie conditions.

The losses due to *P. orthogonia* during the last ten years are discussed [*R.A.E*, A, ix, 584, 585, etc.].

Following upon the work of former years to determine the efficacy of poison bran mash [*R.A.E.*, A, iii, 620; iv, 346] experiments were carried out in 1919 and 1920. The details of these are given; the results proved a failure in every case, in that, although the number of cutworms was reduced, destruction of the crop was not prevented.

A survey was undertaken in 1920 to determine the relation of cultural methods to the abundance of cutworms. A high percentage of injury was shown in all cases where the stubble was only disked or harrowed before seeding. Fields that were ploughed either in autumn or spring showed a somewhat lower percentage, while summer-fallowed fields showed only the small loss of 8·5 per cent. The moths have a decided preference for mellow fields in which to oviposit, and it is evident that the physical condition of the soil during the oviposition period has an important bearing upon the amount of injury in the following spring. It seems as though the greatest injury may be expected in fields in which the surface soil is loose and well-pulverised during the egg-laying period. Such a condition may be due, in summer-fallowed fields, to tillage in late July and August, or it may be a natural condition. When a crop is removed during July or August, the surface crust may become pulverised in many places. Since least injury may be expected in fields where the surface soil is hard or crusted during the oviposition period, it is advisable not to disturb the ground between 15th July and 15th September.

P. orthogonia is not greatly affected by insect enemies. Of 960 larvae collected in 1920, 13·7 per cent. were parasitised, 12·2 per cent. by Diptera, and 1·5 per cent. by Hymenoptera. The parasites included the Tachinids, *Bonnetia compta*, Fall., and *Peleteria robusta*, Wied. Wild birds are the most useful check, particularly the western grasshopper sparrow (*Ammodramus savannarum bimaculatus*) and the horned lark (*Otocoris alpestris leucolaema*). The Carabid beetle, *Calosoma tepidum*, Lec., is probably a less important predator.

A description of the stages of *P. orthogonia* is appended.

WADE (J. S.) & BÖVING (A. G.). U.S. Bur. Ent. **Biology of** *Embaphion muricatum*.—*Jl. Agric. Res., Washington, D.C.*, xxii, no. 6, 5th November 1921, pp. 323–334, 2 plates, 3 figs.

The larvae of *Embaphion muricatum*, Say, and related species of false wireworms have been for the past few years the cause of much injury to growing wheat and other field crops in the semi-arid regions of the middle western United States [*R. A.E.*, A, ix, 162]. The steady progress of cultivation of the grassy prairies has been an important factor, the removal of native food-plants causing this and other beetles to feed more and more upon cultivated grains. As the insect is a very hardy one and rapidly adapts itself to changed conditions and to new food-plants, it is a serious menace to grain production. Early records of its occurrence and its distribution are described, as well as the

stages of its growth. The observations on the life-history were made under laboratory and field conditions in south-central Kansas, at an altitude of approximately 1,200 feet. The studies are, however, incomplete, and the records will undoubtedly vary under different conditions of latitude, altitude and humidity.

The eggs are deposited in loose, dry or slightly moist soil, from half an inch to an inch below the surface, either singly or in clusters of up to a dozen in one place. At temperatures from 80° to 90° F. the average incubation period is about 10 days, while at 68° to 70° F. it is about 13 days. Though abnormal conditions may prolong this period, no ill effects were noted in the eggs, and no infertile eggs were ever collected under field conditions. Larvae hatched in June lived on an average from 80 to 85 days. The greatest damage in the field occurs in the autumn, principally between 20th September and 15th October, when the larvae work along the soft soil of the rows of newly sown or sprouting wheat and destroy all the germinating powers of the grain, sometimes leaving only the outer husk. They prefer slightly damp soil, and feed upon the roots and seeds of many plants and grasses, and to a certain extent on decaying organic matter. They become nearly mature during late autumn, and pass the winter in this condition. From 1st November to 15th March in southern Kansas, they are very inactive and feed very little. After a semi-dormant, prepupal condition lasting 7 to 9 days the pupal stage is reached, and lasts from 18 to 20 days.

The adults also feed upon wheat grains and other seeds, and may be found around the bases of wheat stacks in July. An abundance of rainfall checks the extent of the damage, but under conditions favourable to the pest from 10 to 50 per cent. loss of wheat may occur. Adults have been collected beneath wheat shocks in fields where the temperature was 100° F., but they cannot survive temperatures as low as −9° F. During prolonged droughts the beetles seem to disappear entirely, but immediately reappear after rain. Winter may be passed in the adult as well as the larval stage, but the mortality of overwintering adults is great.

Little opportunity for studying parasites occurred, but adults of *Perilitus eleodis*, Vier., were reared from adults of *E. muricatum*, the larvae being attacked by the fungus, *Metarrhizium anisopliae*, and by an obscure bacterial disease, which usually ended fatally.

Rotation of crops is one of the most important remedial factors; the maximum injury is found where the ground has been cropped with wheat continuously for several years, while the minimum damage occurs with maize, kaffir corn, milo, and other crops requiring some cultivation during the growing season. The beetles are wingless, and therefore disperse slowly. Land ploughed in late autumn or early spring to destroy *Heliothis* (*Chloridea*) *obsoleta* (corn earworm) was also cleared to a large extent of false wireworms. All plants of Russian thistle [*Salsola kali*] and other weeds or heavy growths of grasses likely to shelter the beetles should be destroyed in infested fields and their vicinity. Poisoned bran mash was tried as a remedy, but while a few adults fed upon it, experiments with the larvae were unsatisfactory and do not show any practical value. Late autumn sowing of wheat seems to be successful only in very dry seasons, and then the grain may be severely attacked if it has to lie in the ground for some time before rain falls and germination occurs.

WEISS (H. B.) & LOTT (R. B.). **Notes on *Orchestes rufipes*, Lec., in New Jersey.**—*Psyche, Boston, Mass.*, xxviii, nos. 5–6, October–December 1921, pp. 152–155.

Rhynchaenus (*Orchestes*) *rufipes*, Lec., has been previously recorded in various parts of U.S.A. on *Salix lucida*, and on *S. pentandra* in Canada. In New Jersey it is known to occur on *S. lucida* and *S. nigra*.

In New Jersey the beetles hibernate under loose bark and dead wood about the end of September and beginning of October. The adults emerge in the middle of April and feed on the leaves up to the end of May. The eggs are deposited singly along the lower epidermis during the end of May and first part of June. On hatching, the larvae begin to mine the leaves until the beginning of July, when they pupate. This stage lasts 7–10 days, and the adults on emerging feed continuously till the cold weather, when hibernation occurs.

The remedial measure recommended is spraying the lower leaf surfaces with lead arsenate during the end of April or beginning of May. This should secure complete destruction, owing to the length of time during which the adults feed before depositing eggs.

A description is given of all stages of this weevil.

SIEGLER (E. H.), U.S. Bur. Ent., & ROBERTS (J. W.). **The Dusting Method.**—*Rept. Maryland Agric. Soc., College Park, Md.*, iii (1918), 1919, pp. 110–126. [Received 4th January 1922.]

A short report on the dusting method for fruit trees, based largely on the experiments of the Federal Department, is given. The chief advantages of dusts over liquids are that less labour and time are required, and hilly and rough orchards may be more easily treated. Dust materials are rather more expensive than liquid ones. The following formulae are in general use against chewing insects and fungous diseases: 10–15 per cent. lead arsenate powder and 90–85 per cent. superfine sulphur, or 10 per cent. lead arsenate powder, 50 per cent. superfine sulphur and 40 per cent. filler (hydrated lime or gypsum). The second formula is cheaper, but its fungicidal value is less. Against chewing insects only 10–15 per cent. lead arsenate powder and 90–85 per cent. filler may be used.

Sufficient tests have not yet been made to establish the true value of dusting under all conditions. Up to the present, light infestations of codling moth [*Cydia pomonella*] are controlled as well by dust as by liquid sprays, but in heavy infestations the latter are superior. The use of liquid sprays should be continued against all insects and diseases requiring dormant treatment, and against sucking insects.

CORY (E. N.). **The Oriental Peach Moth** (*Laspeyresia molesta*, **Busck**). —*Rept. Maryland Agric. Soc., College Park, Md.*, iii (1918), 1919, pp. 138–141. [Received 4th January 1922.]

It has been suggested that areas infested with *Cydia* (*Laspeyresia*) *molesta*, Busck, should be quarantined, but the author does not consider this necessary. The bionomics and control of the pest have already been noticed [*R.A.E.*, A, vi, 369; vii, 223, etc.]. Examination proved that in 1918 less than 5 per cent. of the peaches were destroyed by it.

CORY (E. N.). **Report of the State Entomologist.**—*Rept. Maryland Agric. Soc., College Park, Md.*, iii (1918), 1919, pp. 168–175. [Received 4th January 1922.]

A brief account is given of some of the chief insect pests of Maryland that occurred in 1917–18, including *Cydia* (*Laspeyresia*) *molesta*, Busck, *Macrosiphum solanifolii*, Ashm., *Melanoplus femur-rubrum*, DeG., *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., *Tarsonemus pallidus*, Banks, *Aphis maidiradicis*, Forbes, *A. pseudobrassicae*, Davis, *Brevicoryne* (*A.*) *brassicae*, L., *Aspidiotus perniciosus*, Comst., *Lygidea mendax*, Reut., *Galerucella luteola*, Mull., *Chrysobothris femorata*, F., *Trichobaris trinotata*, Say, *Cephus* sp. (probably *cinctus*, Nort.) and *Tetramorium caespitum*, L.

Strawberries were dusted three times with a mixture of 85 per cent. sulphur and 15 per cent. lead arsenate for strawberry weevil [*Anthonomus signatus*]. Tables are given showing the results of demonstrations for the control of curculio [*Conotrachelus nenuphar*], codling moth [*Cydia pomonella*] and peach and apple diseases.

CORY (E. N.). **Report of Dusting Investigations.**—*Rept. Maryland Agric. Soc., College Park, Md.*, iv (1919), 1920, pp. 106–116. [Received 4th January 1922.]

The bulk of the information contained in this report has already been noticed from another source [*R.A.E.*, A, ix, 134].

CORY (E. N.). **Report of Dusting and Spraying Investigations.**—*Rept. Maryland Agric. Soc., College Park, Md.*, v (1920), 1921, pp. 318–327. [Received 4th January 1922.]

During 1920 dusting experiments were undertaken for *Eulecanium* (*Lecanium*) *nigrofasciatum*, Perg. (terrapin scale), and 94·2 per cent. mortality was obtained by three applications of 60 per cent. sulphur and 40 per cent. lime. Only one dusting demonstration was made for strawberry beetle [*Anthonomus signatus*], and complete control was effected with 85 per cent. sulphur and 15 per cent. calcium arsenate. Examples are given showing that this formula considerably increases the crop. Variable results were obtained with sulphur impregnated with 2 per cent. nicotine sulphate with approximately 30 per cent. inert ingredients against Aphids on tomatos, beans and peas. Lima leaves were dusted for *Aphis rumicis*, and complete control was obtained in 36 hours. Poor results were obtained against the tomato aphis [*Macrosiphum lycopersici*] and *Acyrthosiphon* (*Macrosiphum*) *pisi*; the composition used for the latter was 68 per cent. sulphur, 2 per cent. nicotine and 30 per cent. inert materials.

Various spraying demonstrations on apples and peaches are recorded, and in each case the cost of the materials used and the percentage of fruit produced are given. Miscible or soluble oils did not prove effective against the peach tree borer [*Aegeria exitiosa*, Say], but paradichlorobenzene gives promise of being efficient [*R.A.E.*, A, viii, 189].

STCHERBAKOV (Ph.). **Клеверная Эвритома : ее Биология и Хозяйственное Значение.** [*Eurytoma gibbus*, Boh., its Biology and Economic Importance.]—**Труды Шатиловской Сельско-Хозяйственной Опытной Станции.** [*Works of the Shatilov Agric. Expt. Sta.*], *Orel*, 1919, no. 7, 1920, 52 pp., 3 plates. [Received 2nd January 1922.]

The biology of *Bruchophagus* (*Eurytoma*) *gibbus*, Boh., is described, and the economic importance of this Chalcid as a pest of clover in Russia is discussed [*R.A.E.*, A, iii, 8]. Although it has a wide distribution in Russia, the damage caused by it is not apparently sufficient to warrant extensive remedial measures. A description is given of an unidentified Chalcid parasite, which is apparently of little importance in control of the pest.

MICHELSON (I. Ia.). **Вредители Цитрусовыхъ Культуръ и мѣры борьбы съ ними.** [Citrus Pests and their Control.]—**Министерство Земледѣлія Республики Грузіи. Сухумская Опытная Станція.** [*Minist. Agric., Georgian Republic, Sukhum Expt. Sta.*], *Sukhum*, Leaflet no. 12, 17th January 1920, 15 pp. [Received 2nd January 1922.]

The pests of *Citrus* are reviewed with special reference to those occurring in Abchazia (Caucasus). These include *Gryllotalpa gryllotalpa* (*vulgaris*); unidentified species of thrips; *Pentatoma* sp.; *Syromastes* sp., not causing much damage; and the Aphids, *Toxoptera aurantiae*, Koch (*camelliae*, Kalt.), also recorded from Batoum, and *Macrosiphum* (*Siphonophora*) *citrifolii*. The chief pests are, however, the Coccids: *Pulvinaria* sp.; *Ceroplastes* sp.; and *Aspidiotus* sp., which has recently become much more numerous. *Pseudococcus* (*Dactylopius*) *citri*, Risso, was less abundant in 1919 than in the previous year. *Saissetia* (*Lecanium*) *oleae*, Wlk., is also an occasional pest. Other miscellaneous insects recorded from *Citrus* in Abchazia are *Epicometis* (*Tropinota*) *hirta*, Pod., and several mites.

The remedial measures for these pests, as adopted elsewhere, are discussed, and several formulae for the preparation of insecticides are quoted.

KOROLKOV (D. M.). **Отчетъ за 1915 г. о Работахъ по изученію Вредителей Садовыхъ Растеній.** [Report for 1915 on the Work in Connection with the Study of Pests of Garden Plants.]—**Матеріалы по Изученію Вредныхъ Насѣкомыхъ Московской Губерніи.** [*Material for the Study of Injurious Insects of the Moscow Govt.*]—*Moscow*, no. 7, 1917, 36 pp., 1 plate. [Received 2nd January 1922.]

Zophodia convolutella, Hb. [*R.A.E.*, A, iv, 326] and *Incurvaria capitella*, Cl. [*R.A.E.*, A, iii, 643] are serious pests of currants and gooseberries in Russia. The remedial measures advocated for the latter include spraying before the buds open with milk of lime (3 lb. unslaked lime to one bucket water), cutting down the previous year's canes, clean cultivation and the burning of all trash. A drastic but effective method is to pick all the berries before they are quite ripe,

when the first ones begin to show red. By this means the larvae are also collected, and the following year's crop will be completely free from these moths.

MORITZ (L.). **Полевые вредители и Меры Борьбы с ними.** [Field Pests and their Control.]—**Ставропольский Губземотдел. Отделение Борьбы с Вредителями Сельского Хозяйства** [*Stavropol Govt. Div. Control Agric. Pests*], *Stavropol*, 1920, 18 pp., 8 figs. [Received 5th January 1922.]

A brief account is given of the chief agricultural pests as occurring in South Russia, and chiefly in the Stavropol district. The remedial measures are also described, the species dealt with being: *Locusta (Pachytylus) migratoria*, L., *Dociostaurus* (*Stauronotus*) *maroccanus*, Thunb., *Calliptamus italicus*, L., *Haplothrips* (*Anthothrips*) *tritici*, Kurd., *Thrips linarius*, Uzel, *Eurygaster integriceps*, Put., *E. maura*, L., *Brachycolus noxius*, Mord., *Toxoptera graminum*, Rond., *Agriotes segetis*, Bjerk., *Athous niger*, L., *Anisoplia austriaca*, Hbst., *A. crucifera*, Hbst., *Euxoa* (*Agrotis*) *segetum*, Schiff., *Oria* (*Tapinostola*) *musculosa*, Hb., *Heliothis dipsacea*, L., *Loxostege* (*Botys*) *sticticalis*, L., *Oscinella* (*Oscinis*) *frit*, L., *Mayetiola* (*Cecidomyia*) *destructor*, Say, *Cephus pygmaeus*, L., and *C. tabidus*, F.

MORITZ (L.). **Главнейшие Насекомыя вредящие Садам и Меры Борьбы с ними.** [The chief Insects injurious to Gardens and their Control.]—**Ставропольский Губземотдел. Отделение Борьбы с Вредителями Сельского Хозяйства** [*Stavropol Govt. Div. Control Agric. Pests*], *Stavropol*, 1920, 22 pp., 11 figs. [Received 5th January 1922.]

The life-history of and remedial measures against the chief pests of gardens are briefly dealt with. The insects concerned are:—*Hyponomeuta malinellus*, Z., *H. variabilis*, Z., *Cydia* (*Carpocapsa*) *pomonella*, L., *Cossus cossus*, L., *Zeuzera aesculi*, L., *Malacosoma neustria*, L., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Porthetria* (*Lymantria*) *dispar*, L., *Hibernia defoliaria*, L., *Cheimatobia brumata*, L., *Rhynchites pauxillus*, Germ., *R. bacchus*, L., *Sciaphobus* (*Sciaphilus*) *squalidus*, Germ., *Anthonomus pomorum*, L., *Epicometis hirta*, Pod., *Scolytus pruni*, Ratz., *S. rugulosus*, Ratz., *Aphis pomi*, De Geer (*mali*, F.), *Psylla mali*, Schmdbg., *Lepidosaphes ulmi*, L. (*Mytilaspis pomorum*, Bch.), and *Aspidiotus ostreaeformis*, Curt.

MORITZ (Z.). **Амбарные Вредители и Борьба с ними.** [Pests of Stored Products.]—**Ставропольский Губземотдел. Отделение Борьбы с Вредителями Сельского Хозяйства** [*Stavropol Govt. Div. Control Agric. Pests*], *Stavropol*, 1920, 12 pp., 3 figs. [Received 5th January 1922.]

The chief pests affecting stored products, of which the life-history and control are here described, are *Calandra granaria*, L., *Tenebrio molitor*, L., *Tribolium confusum*, Duv., *Silvanus surinamensis*, L., *Laemophloeus* (*Cucujus*) *testaceus*, F., *Tenebroides mauritanicus*, L., *Sitotroga cerealella*, Ol., *Tinea granella*, L., *Tyroglyphus farinae*, Koch, *T. longior*, Gerv., and *T. siro*, L.

Moritz (L.). **Перелетная или Азиатская Саранча и Меры Борьбы с нею.** [*Locusta migratoria*, L., and its Control.]—**Ставропольский Губземотдел. Отделение Борьбы с Вредителями Сельского Хозяйства** [*Stavropol Govt. Div. Control Agric. Pests*], *Stavropol*, n.d., 11 pp., 1 plate. [Received 5th January 1922.]

The remedial measures planned for the control of *Locusta* (*Pachytylus*) *migratoria*, L., in 1921, consist chiefly of poisoning the food-plants.

Moritz (Z.). **К Биологии Златогузки** (*Euproctis chrysorrhea*, **L.**) (**Lepidoptera; Lymantridae**). [On the Biology of the Brown-tail Moth.]—**Труды Ставропольского Сельско-Хозяйственного Института**, *Acta Inst. Agron. Stauropolitani*, *Stavropol*, i, no. 9, 3rd September 1921, pp. 23–30. [Received 12th January 1922.]

The life-history of *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) as studied for the most part under laboratory conditions in Stavropol, is described at length. Although this moth occurs every year, it is not apparently a very serious pest of fruit trees. It breeds in abundance on wild shrubs, the preferred food-plant being hawthorn. It also occurs on roses, plums and pears, but seldom on apples and cherries.

Under laboratory conditions pear leaves are preferred to those of apple. Whereas most authors give the number of moults of the larvae as four, seven are recorded in the present observations. This may possibly be due to abnormal conditions in the laboratory.

de Joannis (J.). **Note sur** *Stagmatophora serratella*, **Tr. (Lep. Tineidae).**—*Bull. Soc. Ent. France, Paris*, 1921, no. 18, 23rd November 1921, pp. 265–267.

The caterpillars of *Stagmatophora serratella*, Tr., are recorded from roots of *Antirrhinum majus* at Mentone, apparently for the first time. They were found in company with the weevil, *Mecinus sicardi*, Hust. Previous records and the geographical distribution of *S. serratella* are reviewed.

Poutiers (R.). *Stagmatophora serratella*, **Tr. (Lep. Tineidae) et** *Mecinus sicardi*, **Hust. (Col. Curculionidae) Causes de Cécidies sur** *Antirrhinum majus*, **L.**—*Bull. Soc. Ent. France, Paris*, 1921, no. 18, 23rd November 1921, pp. 269–271.

Stagmatophora serratella, Tr., infesting *Antirrhinum majus*, apparently hibernates in the larval stage inside the gallery. The galleries are made longitudinally upwards, seldom below the collar of the plant. The larvae may ascend and mine the smaller branches, which soon die in consequence, without showing any gall formation. Oviposition occurs in July.

Mecinus sicardi, Hust., remains at the base of the plant, the whole life-cycle occurring apparently in the plant. The adult weevils emerge from the end of July onwards, those developing towards the end of the summer remaining in the gallery until the following spring. Two different species of Braconids, evidently parasites of *Mecinus*, were found in the galleries. The structure of the galls produced by *S. serratella* and *M. sicardi* is described.

LICHTENSTEIN (J. L.) & GRASSÉ (P.). **La Teigne de la Pomme de Terre** (*Phthorimaea operculella*, **Zell.) dans le Département de l'Hérault (Lep. Tineidae).**—*Bull. Soc. Ent France, Paris*, 1921, no. 18, 23rd November 1921, pp. 267-268.

Phthorimaea operculella, Z., is apparently spreading in France, and is now recorded from Hérault. The necessity for careful inspection of imported potatoes and of those transported from infested localities is emphasised.

VAYSSIÈRE (P.). **Dégâts causés par le Grillon domestique.**—*Bull. Soc. Ent. France, Paris*, 1921, no. 17, 9th November 1921, p. 248.

Gryllus domesticus, L., is recorded as damaging woollen and silk materials in a Paris shop. The crickets evidently came from a neighbouring bakery. Cotton goods were not touched.

SOBRERO (L. R.). **La Pulverización de los Arboles y Plantas cultivadas.**—*Gaceta Rural, Buenos Aires*, xv, no. 169, August 1921, pp. 31-45, 1 fig.

Instructions are given for spraying fruit-trees, and the necessary apparatus and machinery are described. The preparation of such insecticides as calcium arsenite, calcium sulphide, nicotine solution and Bordeaux mixture is explained, and the combination of certain insecticides and fungicides is discussed.

LIGNIÉRES (J.). **Sobre los Metodos para la Destrucción de la Langosta, de algunos Coleopteros y otros Parasitos de la Agricultura.**—*Rev. Agric., San Jacinto, Mexico*, vi, no. 8, December 1921, pp. 479-484.

This is a review of various measures for use against agricultural pests, including in particular a description of the use of flame-throwers and of toxic gases, such as chloropicrin, against locusts, and is written in the hope of arousing interest in Argentina in these new methods.

YOTHERS (W. W.). U.S. Bur. Ent. **Some Fundamentals of Grove Pest Control.**—*Qtrly. Bull. Florida State Plant Bd., Gainesville*, vi. no. 1, October 1921, pp. 1-10.

The control of pests in citrus groves may be arrived at (1) by the reduction of pests to a minimum and maintaining them in such a state; (2) by total and complete dependence on natural control; (3) by dependence on natural control supplemented by artificial means when the pests are too abundant. The first has not been practised to a great extent in Florida, and necessarily involves a knowledge of the life and seasonal history of the most important pests, and also of insecticides. The second method is the most extensively followed, and internal parasites, predacious enemies and entomogenous fungi are undoubtedly important factors in reducing damage from insect pests. The author maintains that the third method is the most practicable and feasible, as it is the least expensive and best adapted to citrus growing at the present time.

The great advantages of the presence of entomogenous fungi are discussed. Practically all whiteflies infesting citrus trees are attacked by them. Spraying for whiteflies is usually done before the fungi

are able to increase rapidly or after they have done the main part of their work. If these Aleurodids are scarce, it may be advisable to permit the fungi to act throughout the rainy season, and to spray when this is over. The fundamental principles relating to the control of whiteflies are mainly applicable to the purple scale [*Lepidosaphes beckii*] also, except that the third brood of the citrus whitefly [*Dialeurodes citri*] deposits eggs in August and early September, the adults emerging the following March, and it therefore does not multiply or reproduce during this time. *L. beckii* reproduces during this entire period, the rate depending on the temperature. The author suggests that steps should be taken to discover predacious enemies or Hymenopterous parasites that would control the purple scale from January to June, thus supplementing the action of the fungi. Until such knowledge is available, spraying should supplement this in the warmer sections of the State.

In discussing the fundamental principles of artificial control, it is shown how the cost of such control may be compared with the expected profits. The first brood of whiteflies is in the most susceptible stage about the middle of April, but as the fruit is then extremely small and sensitive, oil spraying should be postponed. Spraying against this pest should not be undertaken until the eggs have hatched. *L. beckii* is usually present in all stages throughout the year, but more hatching takes place in March and the third week in June and in September. If the scale is abundant, the last week in June will be the most effective date for spraying.

Rust mites are mainly injurious in May and June. On grapefruit they appear somewhat earlier than on oranges. It is now known that soon after the rainy season begins a virulent fungus appears that practically exterminates the mites. Spraying should be undertaken before their maximum infestation, which is about May and June, but the author doubts the profitableness of spraying before the rainy season.

It is not certainly known what kind of oil makes the best insecticide. It is usually thought that an oil possessing high viscosity and low volatility is the most effective in killing insects. For a severe infestation of purple scale an oil of high viscosity may be suitable, while a lower viscosity may be used for whiteflies. Information is also given on sulphur sprays, machinery and other necessary appliances.

MOZNETTE (G. F.). U.S. Bur. Ent. **Notes on the Royal Palm Bug.**—*Qtrly. Bull. Florida State Plant Bd., Gainesville*, vi, no. 1, October 1921, pp. 10–15, 3 plates.

The Lygaeid, *Xylastodoris luteolus*, Barber, has recently been causing serious damage to royal palms (*Oreodoxa regia*) in Southern Florida. It has been previously reported from Cuba, but this appears to be the first record of its occurrence in the United States. The bug attacks young leaflets wrapped up in the spike and the folded leaflets on the leafstalk as it gradually opens. Its attacks result in the dying and browning of the injured portions.

The remedial measure recommended is spraying with one part nicotine sulphate (40 per cent.) to 1,200 parts water. To this diluted spray fish-oil soap was added, using 5 lb. to a 125-gallon tank. Two applications should be made, with a week's interval.

HOWARD (N. F.). U.S. Bur. Ent. **The Mexican Bean Beetle in its Bearing on Florida Citrus Growing.**—*Qtrly. Bull. Florida State Plant Bd., Gainesville,* vi, no. 1, October 1921, pp. 15–24, 7 figs.

Epilachna corrupta, Muls., has become one of the major insect problems of the South. The life-history and habits of this beetle have already been noticed [*R. A.E.*, A, vi, 299; ix, 374]. A careful study is being made of natural control, and the following Coccinellids have been observed to be predacious on it. *Megilla maculata,* DeG., in both larval and adult stages feeds voraciously on the eggs, and less so on younger larvae; *Hippodamia convergens,* Guér, feeds on the eggs in both adult and larval stages; *H. ambigua,* Lec., introduced from California, feeds in confinement on the eggs and younger larvae; *Coccinella novemnotata,* Hbst., and *C. sanguinea,* L., feed in the adult stage on the eggs to some extent, but the former more generally on younger larvae; *Adalia bipunctata,* L., feeds slightly on the eggs and younger larvae.

As regards Pentatomids, *Stiretrus anchorago,* F., feeds in the larval and adult stages on all stages of the beetle, and in September is often seen sucking the juices from the larvae, pupae and adults; *Podisus maculiventris,* Say, has been observed in the field feeding on the larvae, pupae and adults, but is not so abundant. Of ground beetles, *Harpalus caliginosus,* F., has been observed in the adult stage to feed on larvae; *Scarites subterraneus,* F., and *Calosoma sayi,* Dej., feed sparingly on larvae, pupae and adults, but the former is of no importance in the field; *C. sycophanta,* L., from New England, would not feed on any stages of the beetle in confinement. A lace-wing fly, *Chrysopa oculata,* Say, has been observed in the larval and adult stages to feed on the pupae, but is of no importance in natural control. The tiger-beetles, *Tetracha carolina,* L., and *T. virginica,* L., though known to feed voraciously on the larvae, pupae and adults in the larval and adult stages, are of doubtful value in the field. A Reduviid bug, *Arilus cristatus,* L., feeds on larvae, pupae and adults, but is not sufficiently abundant to be of value.

E. corrupta will feed on its own eggs when no other food is available. During the past summer, when the thermometer registered nearly 100° F. in the shade, large numbers of larvae and pupae were killed by the sun on the injured plants or on the hot, dry soil.

A list is given of the known food-plants of this beetle. The mung bean (*Phaseolus mungo*) has never been recorded as a food-plant in spite of repeated experiments, and the horse bean has also been resistant up to date.

MOZNETTE (G. F.). U.S. Bur. Ent. **Notes on the Citrus Root Weevil as a Strawberry Pest.**—*Qtrly. Bull. Florida State Plant Bd., Gainesville,* vi, no. 1, October 1921, pp. 24–26, 2 figs.

In 1920 strawberry plants were seriously damaged in Florida by larvae of *Pachnaeus litus,* Germ., tunnelling in the main tap-root or feeding on the fibrous lateral roots. The author quotes previous works, which show that this weevil is a general feeder. At the time of the infestation no adults were found, but those reared from the larvae emerged during May and early June, the approach of the rainy season. Adults were then collected in the fields on weeds. When the larvae were abundant in the dry winter season, it was

observed that the outside rows were more infested than those in the centre of the fields. Fields carefully cultivated and kept free from weeds showed considerably less infestation.

PAOLI (G.). **Intorno alla** *Laspeyresia molesta,* **Busck (la "Tignola orientale del Pesco") all'Estero e in Italia.** [On *Cydia molesta,* the Oriental Peach Moth, abroad and in Italy.]—*L'Agric. Colon., Florence,* xv, no. 12, 1st December 1921, pp. 572–576, 1 plate.

With reference to the recent introduction of *Cydia molesta,* Busck, into Italy [*R.A.E.*, A, x, 81] information is given on the spread of this Tortricid in Japan, Korea, Australia and the United States. The morphology and biology of the various stages are briefly dealt with, and the injury done and the measures against it are described. It is only during the past six or seven years that withering of the tips of peach branches has been observed in Liguria, but the moth must have been imported some time previously. It may possibly occur on the French Riviera.

Other peach pests mentioned are *Anarsia lineatella,* Z., and *Cydia* (*Carpocapsa*) *pomonella,* L.

MOLZ (E.). **Versuche zur Ermittlung des Einflusses äusserer Faktoren auf das Geschlechtsverhältnis des Rübennematoden** (*Heterodera schachtii,* **A. Schmidt**). [Experiments to determine the Influence of External Factors on the proportionate Abundance of the Sexes of the Beet Nematode, *H. schachtii.*]—*Landw. Jahrbücher,* liv, 1920, pp. 769–791, 2 figs., 3 plates. (Abstract in *Zeitschr Pflanzenkr., Stuttgart,* xxxi, no. 7–8, 1921, pp. 257–258.)

Abundant manuring with substances rich in nitrogen and in humus favours a preponderance of females of *Heterodera schachtii,* Schmidt. This explains their abundance in places where *Solanum nigrum* flourishes. The number of males is increased by a marked excess of manuring, and, on the other hand, all conditions that impoverish the soil have the same result. The variety of the plant also exercises a great influence; sugar-beet favours the females. This Nematode becomes injurious when there has been a succession of crops in rotation that are favourable to it.

MILLER (D.). **The Gall Chalcid of Blue-Gum.** *N.Z. Jl. Agric., Wellington,* xxiii, no. 5, 21st November 1921, p. 282, 4 figs.

Blue-gum trees (*Eucalyptus globulus*) are often found to be dead or dying as a result of attack by a new species of gall Chalcid of the genus *Rhicnopeltella.* This insect occurs in most parts of New Zealand. The adults emerge in the summer months and may be found in large numbers on the bark of infested trees. The larvae live in small cells in the sap-wood, immediately beneath the bark, causing the latter to develop abnormally, with a series of swellings on the surface. The infested twig or branch soon shows a gnarled appearance and eventually dies. The tree throws out new growth, but this is attacked by the larvae of the next generation, so that finally the whole tree is killed. The full-grown larvae pupate in the cells beneath the bark, from which the adults escape through minute holes.

The complete life-history of this Chalcid is being worked out, and an endeavour is being made to find some parasite by means of which its numbers may be reduced. In Tasmania and Australia, whence it probably comes, it has apparently passed unnoticed, perhaps owing to the activities of natural enemies. The gnarled appearance of the bark of blue-gums caused by it has frequently been attributed to the gum-tree Coccid, *Eriococcus coriaceus*, Mask., and figures are given showing the distinction between the two types of injury.

ATKINSON (E. H.). *Phormium tenax.* **Diseases and Insect Pests.**—*N.Z. Jl. Agric., Wellington,* xxiii, no. 5, 21 November 1921, pp. 298–302.

There are many insect pests of *Phormium tenax* (flax) in New Zealand, all of which are indigenous, but it was not until the early years of the present century, when the draining of swamps placed this plant among the principal agricultural crops of the country, that their depredations were of serious importance. The three chief pests are the larvae of the moths, *Xanthorhoe praefectata*, Wlk., *Melanchra steropastis*, Meyr., and *Oeceticus omnivorus*, Fereday. The first named, which is the most important pest, has been dealt with at length in previous papers [*R.A.E.*, A, vii, 82]. *M. steropastis* attacks the edges of the leaves, and the larvae shelter in the dead leaf-tubes. Pupation occurs usually in the ground, though pupae have been found in the rolled-up leaves. *O. omnivorus* is a widely distributed and well-known Psychid moth, its conspicuous bags hanging from the leaves or stems of a variety of plants. The larvae are active most of the year, and eat large patches from the lower surface of the leaf, sometimes extending through to the upper surface, and making more or less circular holes in the blades. Besides parasites, these larvae are attacked by predators, including larvae of the hover-fly, *Syrphus ortas*, and insectivorous birds.

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa, Pretoria,* iii, no. 6, December 1921, pp. 494–496.

Anuraphis persicae-niger (black peach aphis) and *Myzus persicae* (green peach aphis) are troublesome in the high veld every spring, but were so numerous in 1921 that many peach trees bore no fruit and were practically defoliated. The new shoots appear stunted, and the leaves are small, curled and deformed. The two species frequently occur together. Plums and apricots were infested to a less extent. *A. persicae-niger* lives through the entire year on peach ; *M. persicae* winters on cabbage and similar plants and migrates back to peach in early spring. Very hot weather or drenching rain are both very efficient checks on the numbers of these Aphids. Enemies include Coccinellids, larvae of Syrphid flies, and internal parasites. The Aphids, however, multiply rapidly at temperatures several degrees below that necessary to their insect enemies, and spraying is therefore essential. *A. persicae-niger* can be controlled by spraying before any foliage appears, thus killing the colonies present, but spraying for *M. persicae* must be done after the new growth starts, but as soon as the attack begins and before the leaves become distorted, otherwise the insects can shelter within the curled foliage. The standard spray mixture is 1 part tobacco extract sheep dip to 8 parts water, with about 1 lb. soap to 20 gals. of the spray.

Trioza sp. is generally considered only a minor pest of *Citrus*. The eggs are laid on the tips of the twigs and the newly hatched insects settle on the lower surface of the expanding leaves, a rounded pit forming in the leaf beneath each one. This Psyllid is common in the east of the Cape and in Natal and the Transvaal, and is thought to spread to *Citrus* from some native plant. The attack is generally most severe on nursery or newly planted trees, but bearing trees are occasionally badly damaged, the new growth being blanched and deformed.

Leaf-eating beetles that have recently been troublesome include *Ellimenistes laesicollis*, which usually lives among native vegetation, but attacks cultivated plants in the vicinity when this is cleared. The Coccinellid, *Epilachna dregei*, defoliates potatoes and can be killed by lead arsenate. From the Northern Transvaal a beetle, supposed to be *Colasposoma scutellare*, is reported as devastating a garden and orchard. A somewhat similar beetle, *Plagiodera cuprea*, is very prevalent on a veld plant, and has also been recorded as a pest of certain cultivated plants. A serious outbreak of caterpillars of *Heliothis* (*Chloridea*) *obsoleta* was reported in one district; it lasted about a week, during which time newly formed fruit was badly damaged. The weed, *Solanum auriculatum*, is noted for being heavily infested with the bug, *Acanthocoris fasciculatus*, F. In recent years, records have been made of its attacks on potatoes, tomatos and chilli plants.

POMEROY (A. W. J.). **Entomology.**—*Nigeria: Ann. Rept. Agric. Dept., Southern Provinces, for 1st January 1920 to 31st March 1921*, Lagos, 1921, pp. 21–23. [Received 10th January 1922.]

The chief cotton pests of Southern Nigeria are the cotton-stainers, *Dysdercus superstitiosus*, F., *D. melanoderes*, Karsch, *D. fasciatus*, Stål, and *Oxycarenus dudgeoni*, Dist., and the bollworms, *Diparopsis castanea*, Hmps., and *Earias biplaga*, Wlk., those of minor importance being the grasshopper, *Zonoceros variegatus*, L., and the leaf-roller, *Sylepta derogata*, F., and other Lepidopterous larvae. The cotton-stainers are more numerous in districts where two crops are grown.

Mussidia nigrivenella, Rag., which attacks mature pods of cacao, may be controlled by burning all infested pods. This moth also attacks maize. An undescribed species of *Cirphis* has been causing considerable damage in maize stalks. Experiments in burying the old stalks to prevent the emergence of the adult moths have not been conclusive.

Mango fruits are attacked by the moth, *Achaea lienardi*, Boisd., against which no satisfactory remedial measure has yet been devised.

Some account is given of the investigations on the wild silk produced by moths of the genus *Anaphe*.

QUINN (G.). **The Codlin Moth** (*Carpocapsa pomonella*, **Linn.**).—*Jl. Dept. Agric. S. Australia, Adelaide*, xxv, no. 4, November 1921, pp. 288–290.

The various protective and remedial measures against *Cydia* (*Carpocapsa*) *pomonella* adopted in South Australia, where such treatment is compulsory, are described.

TREHERNE (R. C.). **Notes on the Aeolothripidae (2).**—*Proc. Entom. Soc. Brit. Columbia, Victoria,* System. Ser., no. 16, February 1920, 1921, pp. 7–15. [Received 12th January 1922.]

This paper contains further information on species of *Aeolothrips* [*R.A.E.*, A, viii, 147]. The life-history and habits of several species are not well known. *A. fasciatus* has been recorded as common on peas and beans; in British Columbia it is frequently found with swarms of *Frankliniella tritici* in flower heads, and it has been reported in various parts of the world as predacious on other thrips. In Florida, *A. bicolor* is often abundant on oats in the spring, and damages them materially. In British Columbia, *A. annectans* has occurred with *Thrips tabaci* on onion foliage. In Florida, *A. floridensis* is invariably found in association with other species.

A list of the species of thrips belonging to this family is appended.

DOWNES (W.). **The Life-history of** *Apateticus crocatus,* **Uhl.**—*Proc. Entom. Soc. Brit. Columbia, Victoria,* System. Ser., no. 16, February 1920, 1921, pp. 21–27, 5 figs. [Received 12th January 1922.]

A full description is here given of all stages of *Apateticus crocatus*, Uhl., together with its life-history and feeding habits. This Pentatomid bug is fairly common in Victoria during the late summer and autumn, and is of considerable economic value, as it feeds to a large extent on tent caterpillars [*Malacosoma*] and those of *Ellopia somniaria.*

COCKLE (J. W.). *Vitula serratilineella*, **Rag. A Honey-Feeding Larva.**—*Proc. Entom. Soc. Brit. Columbia, Victoria,* System. Ser., no. 16, February 1920, 1921, pp. 32–33. [Received 12th January 1922.]

Larvae of *Vitula serratilineella*, Rag., are recorded as infesting beehives and feeding on the honey. A description is given of the mature larva and of the pupa. This moth is nearly allied to *V. edmandsi*, Pack., which has been stated to infest the nests of bumble bees.

BUCKELL (E. R.). **Notes on the Ecological Distribution of some Orthoptera from the Chilcotin District of British Columbia.**—*Proc. Entom. Soc. Brit. Columbia, Victoria,* System. Ser., no. 18, February 1921, pp. 32–38. [Received 12th January 1922.]

This paper contains notes on the distribution of Orthoptera in British Columbia in relation to the flora, etc., with a list of the species collected during 1920.

BUCKELL (E. R.). **The Locusts of British Columbia.**—*Proc. Entom. Soc. Brit. Columbia, Victoria,* Econ. Ser., nos. 13 and 15, June 1921, pp. 113–123. [Received 12th January 1922.]

A brief outline is here given of locust outbreaks in Canada, and the following are recorded as the species chiefly responsible for them :—*Camnula pellucida, Melanoplus atlantis, M. affinis, M. femur-rubrum, M. bivittatus, M. packardi* and *M. spretus.*

The several methods employed in controlling them are reviewed, and include the preparation and distribution of the Kansas and Criddle baits [*R.A.E.*, A, i, 453; ii, 249; etc.], ploughing, and the use of various machines for collecting the hoppers.

Treherne (R. C.). **A Further Review of Applied Entomology in British Columbia.**—*Proc. Entom. Soc. Brit. Columbia, Victoria*, Econ. Ser., nos. 13 and 15, June 1921, pp. 135–146. [Received 12th January 1922.]

In this paper the author reviews the progress of applied entomology in British Columbia in the past few years. The formation of the Dominion Entomological Branch, the work of the various officials and the chief insect pests investigated each year, are recorded.

Lyne (W. H.). **A Talk on Insects imported from the Orient.**—*Proc. Entom. Soc. Brit. Columbia, Victoria*, Econ. Ser., nos. 13 and 15, June 1921, pp. 146–148. [Received 12th January 1922.]

The following pests have been found at various times infesting nursery stock imported from Japan to British Columbia: *Aspidiotus perniciosus*, *A. forbesi*, *A. hederae* (*nerii*), *Chionaspis* sp., *Mytilaspis* sp., *Diaspis* sp., *Lecanium* sp., and eggs of *Porthetria dispar* found on the bark of arborvitae. Larvae of several beetles have been found boring into the heartwood or feeding on the roots of trees or plants, and a species of Prioninae has occasionally been found in roots of *Wistaria*, walnut and other trees. Larvae closely resembling those of *Popillia japonica* have been imported with iris and other roots, together with other larvae allied to the native species of *Anomala* [*R.A.E.*, A, ix, 583]. Insects infesting miscellaneous stored products include: *Plodia interpunctella*, *Ephestia kühniella*, *Pyralis farinalis*, *Calandra oryzae*, *C. granaria*, *Tribolium confusum*, *Tenebroides mauritanicus*, *Bruchus pisorum*, *B. obtectus*, *Cylas formicarius*, *Phthorimaea operculella*, *Tyroglyphus* sp. and the Angoumois grain moth (*Sitotroga cerealella*).

Davidson (J.). **Man's Influence on the Native Flora, with Special Reference to Insect Pests.**—*Proc. Entom. Soc. Brit. Columbia, Victoria*, Econ. Ser., nos. 13 and 15, June 1921, pp. 148–151. [Received 12th January 1922.]

Tent caterpillars [*Malacosoma* spp.] can be controlled to a large extent by encouraging the growth of such evergreen and deciduous trees as are not food-plants of these moths. A list of these is given.

Miller (D.). **Material for a Monograph on the Diptera Fauna of New Zealand: Part II, Family Syrphidae.**—*Trans. & Proc. New Zealand Inst., Wellington*, liii (new issue), 31st August 1921, pp. 289–333, 6 plates, 86 figs.

The Syrphids dealt with include some 33 species belonging to 16 genera. Of these, three species are of European origin, one is found also in Australia, and the remainder are indigenous, 14 being described as new.

Keys are given to the genera of the Syrphinae, Eristalinae and Milesiinae, and to the species of *Cheilosia*, *Syrphus*, *Melanostoma*, *Platycheirus* and *Helophilus*.

Wolcott (G. N.). **Los Comejenes de Puerto Rico.** [The Termites of Porto Rico.]—*P.R. Insular Expt. Sta., Río Piedras*, Circ. 44, August 1921, 14 pp., 12 figs. [Received 12th January 1922.]

Of the five species of termites that occur in Porto Rico, *Nasutitermes* (*Eutermes*) *creolina*, Banks, *E. debilis*, Heer, and *Constrictotermes discolor*, Banks, are rare and of little importance. The commonest

is *N.* (*E.*) *morio*, Latr., which constructs large oval-shaped termitaria, about 1½ to 2 ft. in diameter, in trees or on fence posts, generally on *Poinciana regia*, and frequently on avocado pear and mango trees. The formation of a colony and the individuals comprising it are described. Houses made of wood are also infested by it. The best method of destroying a colony is to place a poison, such as calomel, white arsenic or Paris green, in a hole made in the termitarium. Poultry are of great service in devouring these termites in the open.

The most important and most destructive species is *Cryptotermes brevis*, Wlk. It usually attacks furniture and houses, the only sign of its presence being little holes surrounded sometimes by small particles of excrement, though the wood may be so badly infested as to be quite rotten. The constitution of the colony is described. White pine and oak are chiefly attacked, mahogany and other hard woods, such as California redwood, being much more resistant. It is difficult to kill this termite without damaging the infested wood. Carbon bisulphide may be injected into the galleries and the openings stopped up. If papers or fabric in drawers or trunks require to be protected, a little paradichlorobenzine will repel the insects and will kill those within, as well as Psocids, ants or cockroaches. When the timber of a building is infested, the only effective remedy is to fumigate the whole building with hydrocyanic acid gas. Many of the insects can be killed by pouring paraffin into the galleries, while badly-infested pieces of wood should be removed and replaced by sound ones. Wood impregnated with creosote is permanently protected from attack; impregnation with a 1 per cent. solution of corrosive sublimate or with chlorinated naphthaline also renders wood immune, provided it is in a dry place, but as these substances are soluble in water, a moist atmosphere destroys their efficacy.

NILSSON-EHLE (H.). **Über Resistenz gegen** *Heterodera schachtii* **bei gewissen Gerstensorten, ihre Vererbungsweise und Bedeutung für die Praxis.** [On the Resistance of certain Varieties of Barley to *Heterodera schachtii*; its hereditary Character and practical Significance.]—*Hereditas, Lund*, i, pt. 1, 1920, pp. 1–34, 4 figs.

Certain varieties of barley appear to be immune from the attacks of *Heterodera schachtii*, and this character is hereditary. It is possible to combine the desired qualities of non-immune varieties with those of the immune ones by crossing them.

Although barley itself is not greatly damaged by the attacks of *H. schachtii*, it is advisable to grow immune varieties in order to protect wheat and oats following it on the same ground. The crossing experiments are described in detail.

VAN HEURN (W. C.). **Waarnemingen betreffende een Parasiet van het Cacao-Motje.** [Observations on a Parasite of the Cacao Moth.]—*Ent. Ber. Ned. Ent. Vereen., The Hague*, vi, no. 122, 1st November 1921, pp. 26–27. [Received 11th January 1922.]

The parasite of the cacao moth, *Acrocercops cramerella*, Sn., found in Java by Dr. Roepke, and denominated "C" [*R.A.E.*, A, i, 57], proves to be an Ichneumonid of the genus *Mesostenus*. Another host of this parasite available at the period when there are no pods on the cacao trees was found by Dr. Dammerman to be the coconut Zygaenid, *Brachartona catoxantha*, Hmps. In 1921 there were bred

from pupae of *B. catoxantha*, received at Buitenzorg, a Tachinid, a small hyperparasite, and four specimens of the above species of *Mesostenus*, which thus seems to be a common parasite of this moth.

Smits van Burgst (C. A. L.). **In de Lucht dansende Sluipwespen. Overwinteren manlijke Sluipwespen in de volkomen Toestand?** [Parasitic Hymeneptera that swarm in the Air. Do male Hymenopterous Parasites hibernate in the Adult Stage?]—*Ent. Ber. Ned. Ent. Vereen., The Hague*, vi, no. 122, 1st November 1921, pp. 29–31. [Received 11th January 1922.]

It does not appear to be well known that species of the Braconid genus *Blacus* swarm and dance in the air in the same way as some midges. The author has captured behaving in this manner both sexes of *Blacus ruficornis*, Nees, a parasite of the larva of *Stereonychus fraxini*, De G., which skeletonises the foliage of ash. It is probable that both the beetle and its parasite occur wherever the ash is grown in Holland. The development of the two insects is contemporaneous, and both hibernate as adults, but whereas both sexes of the host remain alive in winter, only the female of the parasite does so, and this appears to be the rule among parasitic Hymenoptera.

Vogel (J. F.). **De Beukenspringkever** (*Orchestes fagi*, **L.**). [The Beech Weevil, *Rhynchaenus fagi*.]—*Tijdschr. Plantenziekten, Wageningen*, xxvii, no. 12, December 1921, pp. 129–131.

An unusual abundance of the beech weevil, *Rhynchaenus* (*Orchestes*) *fagi*, L., occurred in the summer of 1921. The hibernating adults emerge when the first beech leaves appear, and the females deposit eggs on the midribs. The larvae mine between the leaf-surfaces until they reach the margins, when they pupate. The larval stage lasts about one month and the pupal stage about a fortnight. As the eggs are laid at the end of April, the first adults appear in mid-June, and begin eating circular holes in the leaves; they also attack the unripe nuts.

Berlese (A.). **Agli Olivicultori italiani.** [To Italian Olive Growers.] —*Allevamenti, Palermo*, ii, no. 12, 31st December 1921, pp. 396–397.

In recommending to Italian olive growers his method for combating the olive fly [*Dacus oleae*], the author gives the results obtained in Greece in 1920 [*R. A.E.*, A, x, 3], which induced the Greek Government to extend the work to 5,000,000 trees in the Ionian islands. In Italy, *D. oleae* causes an annual loss of £16,000,000 at par. These measures are now to be officially organised in Tuscany, but nothing is being done in the olive-growing regions of South Italy, where conditions are very similar to those in Corfu. It is suggested that competent observers should be sent to that island in order to obtain information and experience.

De Stefani (T.). **La Difesa dai Parassiti.** [Defence against Plant Enemies.]—*Allevamenti, Palermo*, ii, no. 12, December 1921, p. 398.

This is a criticism of the views expressed by Mattei [*R. A.E.*, A, x, 67]. Imported foreign pests require to be dealt with by means of the enemies that kept them down in their country of origin. The Plant Inspection Service, far from impeding trade, favours it by inspiring confidence in the goods involved.

Berlese (A.). **Su "La Difesa dai Parassiti."** [On the Article "Defence against Plant Enemies."]—*Allevamenti, Palermo,* ii, no. 12, December 1921, pp. 451–452.

In criticising the views advanced by Mattei [see above], it is pointed out that the establishment by selection of a plant variety immune from the pests that usually attack it may require centuries. If the insect enemies of plant pests entirely exterminated them, their own continued existence would be impossible. In certain cases a very efficient enemy (such as the Coccinellid, *Novius cardinalis,* used against *Icerya purchasi*) may eradicate a pest, but it dies out itself in consequence, so that its re-introduction becomes necessary if the insect reappears.

De Stefani (T.). **Notizie critiche su Predatori e Parassiti utili.** [Critical Notes on useful Predatory and Parasitic Insects.]—*Allevamenti, Palermo,* ii, no. 12, December 1921, pp. 450–451.

The view is expressed that while natural enemies are very valuable auxiliaries in combating insect pests, they cannot be looked upon as rendering artificial measures superfluous. Locusts afford an illustration of this, and the recent international convention against them [*R.A.E.*, A, ix, 87] is quoted in full.

An Ordinance to Amend the Law relating to Plant Protection. No. 35 of 1920.—*British Honduras,* 12th November 1920, pp. 145–150.

This ordinance empowers the Governor in Council to proclaim the presence of any pest or disease in any specified area within the Colony, and to take such measures, or to require such measures to be taken by the occupier of such land, as are deemed necessary for the eradication or for the prevention of the spread of diseases or pests, including the total destruction of any plants, whether so affected or not. Powers are also conferred on inspectors to enter land for the purposes of inspection, and the liability rests with the occupier of the land for the expense of carrying out the required measures, certain compensation being allowed by the Legislative Council as the Governor shall think fit. Non-compliance with the terms of the ordinance is punishable by a fine not exceeding £20.

Insect Pest and Quarantine Ordinance, 1901.—*Ceylon Govt. Gazette, Colombo,* no. 7235, 23rd December 1921.

A regulation under the above ordinance, dated 22nd December 1921, states that no tea seed shall be imported into Ceylon, either directly or indirectly, from any place in India, and is in substitution of a previous regulation in 1916 [*R.A.E.*, A, v, 46].

Insect Pest and Quarantine Ordinance, 1901.—*Ceylon Govt. Gazette, Colombo,* no. 7233, 16th December 1921.

Regulations under section 3 of the above ordinance, dated 13th December 1921, prohibit the removal or receipt from any plantation of tea plants or parts of tea plants (other than tea seed or leaf for manufacture), except for the purpose of scientific investigation in the laboratories of the Department of Agriculture, without a permit. No permit shall be granted for the removal or receipt of any tea stumps or plants from any infested area to or through any area that is not infested. These regulations are in substitution of previous ones [*cf. R.A.E.*, A, v, 232; vi, 87: viii, 168].

The Plant Pests Ordinance, 1907.—*Ceylon Govt. Gazette, Colombo*, no. 7214, 30th September 1920. [Received 7th February 1922.]

By a proclamation dated 30th September 1921, under the Plant Pests Ordinance, 1907, *Nephantis serinopa* (coconut caterpillar) is declared a pest. Owners or occupiers of coconut plantations on which any stage of this moth is present are to burn light traps or fires (the form of which is defined) for at least two hours between 7 and 10 p.m. for ten consecutive weeks, at the rate of at least three to every acre.

Quarantine Proclamation, No. 87.—*Commonwealth of Australia Gazette, Melbourne*, no. 94, 8th December 1921. [Received 7th February 1922.]

By a proclamation dated 8th December 1921, under the Quarantine Act, 1908–1920, a proclamation of the 29th September 1921 prohibiting the importation into Australia from New Zealand of plants, due to the existence of *Bacillus amylovorus* (pear blight), is repealed, and the importation into Australia from New Zealand of all plants and parts of plants (including fruit) is prohibited, provided that agricultural seeds, grass seeds, flower seeds, and seeds of pine trees may be imported, subject to the exception of the seeds of any plant of the family Rosaceae and the seeds of any fruit tree.

Order in Council.—*Kingstown, St. Vincent*, 30th December 1920. [Received 16th February 1922.]

By an order in council under "The Importation of Plants Diseases Prevention Ordinance (No. 9), 1906," owing to the presence of "yellow stripe" or mosaic disease of sugar-cane in the West Indies, no sugar-cane, sugar-cane plant, root or cutting in any form shall be imported or introduced into St. Vincent from any place whatsoever. This order is in substitution of an order dated 18th November 1920.

Plants Protection Ordinance, 1909.—*Saint Lucia*, 2nd April 1921. [Received 18th February 1922.]

The regulations under the above ordinance published in 1916 remain in force, and a proclamation dated 2nd April 1921 prohibits the importation into St. Lucia of any sugar-cane plant cuttings, or any grass, fodder, or seeds of grasses and sorghum from any place whatsoever outside the Colony. This does not apply to importations of the above plants imported under licence given by the Governor. These regulations are to protect the Island from mosaic disease, which does not exist there at present.

Brittain (W. H.). **Report of the Professor of Zoology and Provincial Entomologist.**—*Ann. Rept. Secy. for Agric., Nova Scotia, 1920, Halifax*, 1921, pp. 42–58. [Received 12th January 1922.]

The campaign against the brown-tail moth [*Nygmia phaeorrhoea*] was on the same lines as those of former seasons. A list of the food-plants is given on which the species has been found during the past few years. Experiments prove that excessively low temperatures cannot be relied upon to produce excessive mortality among the larvae.

Reports are given of nursery stock inspection, apiary inspection, and investigation work. Orchard and potato spraying and dusting

experiments are being undertaken. Control experiments have been successfully conducted against the apple sucker [*Psylla mali*]. Some progress has been made in investigations on the pea moth [*Cydia nigricana*], onion maggot [*Hylemyia antiqua*], carrot rust fly [*Psila rosae*], and other vegetable pests.

ESSIG (E. O.). **Dust Insecticides in California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 392–394. [Received 13th January 1922.]

Black-leaf 40, used as a dust, has proved successful in the treatment of various Aphids at a strength of 5 or 6 per cent. Against *Aphis malifoliae*, Fitch (rosy apple aphis) dusting was begun as the leaf buds opened. A dust containing 6 per cent. Black-leaf 40 was sufficient against melon aphis (*Aphis gossypii*), *Nysius ericae*, Shill., and nymphs of *Typhlocyba* (*Erythroneura*) *comes*, Say. Adults of the latter were killed by a 10 per cent. mixture.

The caterpillars of various Lepidoptera also readily succumb to Nicodust treatment, including those of *Malacosoma* spp. (tent caterpillars), *Pseudohazis eglanterina*, Boisd. (brown day moth), *Hyphantria cunea*, Drury (fall webworm), and *Pyrameis* (*Vanessa*) *cardui*, L.

Lime liberates the volatile nicotine more readily than kaolin, and is therefore used in preference to the latter as a base for nicotine dusts. The addition of dry sulphur also increases the efficacy of the dust. Black-leaf 40 and sulphur without lime are more efficacious than nicotine and lime without sulphur, but the former mixture, owing to its weight, is not so easily handled in the dusting machines. Nicodust and powdered lead arsenate efficiently controlled caterpillars and flea-beetles, especially the latter on tomatos.

MORRILL (A. W.). **Notes on the Use of Nicotine Dusts.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 394–400. [Received 13th January 1922.]

As a result of the conflicting reports with regard to the effectiveness of nicotine dusts against grape leaf-hoppers [*Typhlocyba comes*] further experiments were undertaken, details of which are described. In the dust tested, 7½ per cent. and 10 per cent. of Black-leaf 40 were used, the analyses showing 2·4 per cent. and 3·8 per cent. of nicotine respectively. In the former the carrier consisted of 90 per cent. hydrated lime and 10 per cent. sulphur, and in the latter about 75 per cent. sulphur and 25 per cent. lime. Ordinary nicotine dusts appear to be of little value against the adults, but stupify the nymphs and cause them to drop. If there are no runners on the ground, and in the case of trellised vines, this is probably equivalent to killing them.

The results obtained against the melon aphis [*Aphis gossypii*, Glov.] are similar to those recorded by Campbell [*R.A.E.*, A, ix, 389]. For scattered infestations the author advises dusts with not less than 7½ per cent. Black-leaf 40. In the case of a general infestation throughout the field it is advisable to use a dust containing only 4 or 5 per cent. Black-leaf 40. The importance of locating incipient colonies of Aphids by scouting early in the season, is emphasised. For cantaloup plants the dust should not contain more than 10 per cent. sulphur to prevent scorching.

The dust does not apparently affect natural enemies such as *Hippodamia convergens* and Syrphid larvae or the Hymenopterous parasite *Aphidius testaceipes*.

Contrary to the results obtained by Parrott [*R.A.E.*, A, ix, 352], colonies of the woolly apple aphis [*Eriosoma lanigerum*] were completely eradicated on small trees with dust blown from a distance of 3 or 4 feet with not enough air pressure to disarrange the waxy covering of the insects. The dust remained attached to the wax, though it was hardly visible to the naked eye.

CAMPBELL (R. E.) & NIXON (W. H.). **Two Mechanical Devices for controlling Western Cucumber Beetles.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 400–404, 1 fig. [Received 13th January 1922.]

Diabrotica soror, Lec. (western twelve-spotted cucumber beetle), causes considerable damage in California every year. It is a universal feeder and attacks such crops as beans, cucumber, lucerne, beets, pumpkins and melons. The cucurbits are injured by the destruction of stems and leaves of the young plants; in lucerne and beets the foliage is damaged, and in beans the foliage, blossoms and pods are attacked. In some cases less than 50 per cent. of the pods develop in consequence, and in several fields of wax beans the injured pods amounted to 60 per cent. on some plants, with an average loss of 28 per cent. Most remedies tested have proved unsatisfactory. In consequence of the beetle's habit of flying up when disturbed, a device constructed on the lines of a hopper-dozer was tried, but did not give the success hoped for, owing to many beetles escaping over the top. An apparatus has now been devised by which 3,500 beetles were caught per acre. The disturbed beetles strike against a screen and fall back into a trough containing oil. The machine is described in detail, with an adaptation of it for use in the case of crops grown on small mounds. The total cost of material is only about 30*s*. and it can be easily and quickly constructed. It may be used for infestations of any low growing crop such as beans, beets, cucumbers, etc., grown in rows, and such crops as lucerne until it is about half grown.

During 1917 and 1918 *D. soror* and *D. trivittata*, Mann., caused serious injury to pumpkins and squashes, but the damage was successfully checked by means of this machine. A small hand machine for use while the plants were small enough to be covered by it was also found effective.

SEVERIN (H. H. P.), HARTUNG (W. J.), SCHWING (E. A.) & THOMAS (W. W.). **Experiments with a Dusting Machine to control the Beet Leafhopper (*Eutettix tenella* Baker) with Nicotine Dust.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 405–410, 1 plate. [Received 13th January 1922.]

Dusting experiments against *Eutettix tenella*, Baker, carried out in 1919, 1920 and 1921 are described. Where the fields are not isolated, invasions from one field to another may occur, but in the spring most of the adults seen in flight are females from the plains and foothills entering the beet fields for oviposition. The percentage of curly leaf increases rapidly with the appearance of the summer generations; this is not the case when the spring brood invades the beet fields unless the pest is unusually abundant. Dust mixtures should therefore be tested when the spring brood first makes its appearance in the beet fields.

The earlier experiments were inconclusive owing to the Nicodust used not being of uniform strength. During the observations made in 1921, three days after the application of a mixture of freshly burnt lime and 10 per cent. Black-leaf 40 there was a reduction of 84 per cent. of the leaf-hoppers. An average of 92·6 per cent. of leaf-hoppers in cages were dead 48 hours after treatment with freshly made dust containing 10 per cent. Black-leaf 40. Dust about 6 weeks old, even when kept in closed tin receptacles, is less effective than when freshly made. As beets were planted after the invasion into the cultivated area had already occurred, no satisfactory conclusions can be drawn as to the value of dust mixtures. The first application was made on the 20th June, and the second on the 24th June, after the second brood nymphs had hatched.

It is evident, however, that with a reduction of 84 per cent. of the leaf-hoppers in a dusted acre of beets, a marked decrease in the percentage of curly leaf would occur in isolated beet-fields, provided that the dust is applied shortly after the spring flight of the adults into the cultivated area.

Smith (R. H.). *Anuraphis helichrysi* **Kalt., a Pest of Prune, Plum, and Red Clover in Idaho.**—*Jl. Econ. Ent. Geneva, N. Y.*, xiv, no. 5, October 1921, pp. 422–423. [Received 13th January 1922.]

Anuraphis helichrysi, Kalt., is the most important Aphid affecting prunes and plums in Idaho. The chief summer food-plants are red clover, *Trifolium pratense*, garden varieties of *Aster*, *Chrysanthemum*, *Dahlia*, and *Erigeron canadensis*. All varieties of prune and plum are susceptible to attack. Occasional colonies found in the spring on peach and apricot did not thrive as well as those on prunes and plums. Small numbers of this Aphid have also been observed on *Achillea millefolium*, *Solidago serotina*, *Trifolium hybridum* and *T. repens*.

The migrant females and males begin developing on the summer food-plants during the latter part of August at an altitude of 3,700 feet. By the 15th September they occur in abundance on foliage of prune and plum. Oviposition occurs at the bases of the buds and on the bark of the branches. The eggs hatch early while the buds of prune and most varieties of plum are entirely dormant and those of peach only slightly swollen. The stem-mothers feed at the bases of buds and on the bark of the last season's growth until the fruit buds begin to open. They begin reproducing about the time green tips appear on the fruit buds of prune. Migrants occur chiefly in the third and succeeding generations. On prune and plum the Aphids are strictly leaf feeding, but on red clover and other summer food-plants, the concealed parts of stems, petioles and blossoms are mostly attacked. The infested leaves of prune and plum curl tightly and develop numerous pocket-like galls. New leaves at the tips of infested branches curl as soon as they develop. The new growth of these branches is stunted and malformed and there is apparently a tendency for the fruit to drop prematurely. The Aphids do not spread readily from one part of a tree to another.

A. helichrysi may be controlled by spraying with ¾-pint Black-leaf 40 to 100 U.S. gals. water, with soap as a spreader, or to 100 U.S. gals. of dilute lime-sulphur solution. The spray should be applied just before the buds of prune and plum open. The eggs and stem-mothers cannot be effectively controlled by lime-sulphur at winter strength.

WELDON (G. P.). **Thrips Injury to Peaches in Southern California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 424–428. [Received 13th January 1922.]

In 1920 serious injury by thrips was caused to peaches in Southern California. Nectarines and plums, and to a less extent apricots, were also attacked. The thrips enter the blossoms as soon as they appear, and both adults and larvae feed on these until the husk is shed from the young peach. After the peaches have reached a considerable size, many thrips are found in the tender growth at the tips of the twigs. The character of the injury varies, and is apparently somewhat influenced by the variety of peach. Although it does not seriously impair the quality of the fruit, it makes it difficult to remove the skin for canning purposes and thus lessens its value. Spraying with nicotine sulphate distillate emulsion mixture did not prove successful, owing to the protection afforded by the stamens and pistil of the peach blossom, nor could the spray be got under the dried-up blossom or husk. Various strengths of Nicodust also gave negative results.

The species concerned has not been definitely identified; it is thought by some to be *Euthrips tritici*, but others, including the author, are inclined to the belief that it is *E. helianthi*. A species possibly identical with it has also been found feeding on apples.

PENNY (D. D.). **The Results of using certain Oil Sprays for the Control of the Fruit Tree Leaf-roller in the Pajaro Valley, California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 428–433. [Received 13th January 1922.]

Oil spraying for the control of *Tortrix* (*Archips*) *argyrospila*, Wlk., in apple orchards has been only partly successful. The chief reason was probably the use of oils not especially adapted to leaf-roller control. It is possible that in cases where negative results were obtained the Western or asphaltum type of oil was used rather than the Eastern or paraffin type. The differences in the action of these oils was recorded by List [*R.A.E.*, A, ix, 153], and several tests with samples of both oils were conducted during the winter of 1920–21. The technique employed is described. Most of the emulsions tested contained 2·5 per cent. of cresol soap as the emulsifying agent. The most satisfactory results were obtained with Pennsylvania gas oil, a 10 per cent. solution killing 80·9 per cent. of the eggs sprayed. Pennsylvania crude oil in both types of emulsions gave good results in 10 per cent. and 15 per cent. strengths. California distillate gave practically no control. The killing efficiency of the Ortho brand of Western crude oil emulsion varies more or less directly with the percentage of oil in the mixtures. A 15 per cent. emulsion killed almost 100 per cent., but a 12 per cent. one was not entirely satisfactory. Further experiments on these lines are to be carried out in the coming season. Crude oil emulsions are widely used in the Pajaro Valley as general winter sprays because of the marked tree stimulation they produce and their effect on many scale-insects. The use of these emulsions would become even more general if they were found to be effective against leaf-rollers at a strength within reasonable cost.

SEVERIN (H. H. P.). **Summary of Life-history of Beet Leafhopper** (*Eutettix tenella*, **Baker**).—*Jl Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 433–436. [Received 13th January 1922.]

In the present observations it is assumed that the first pale green adults which invade the cultivated area represent the first or spring generation. The eggs hatch in from 11 to 15 days, the shortest period occurring from July to September. The hatching period is greatly influenced by the temperature. Eggs laid from 1st November to 15th January either failed to hatch or the nymphs died in the field during the winter. The nymphal periods of the first brood varied from 23 to 37 days, from April to October. Light-coloured adults rarely survive the winter. From the dark females hibernating in the cultivated area four generations were bred. The months of maximum emergence of these four broods correspond to those in which the second to the fifth generations were reared from the pale green leafhoppers, viz., June to July, July to August, September to October, and October to November. The dark leaf-hoppers first appear in the cultivated area in August, and are abundant from September to November. There is a marked decrease in the number of males during December and of females during March and April. The adult life of the dark males is probably about four months, and that of the females about seven or eight months. The dark males follow the females to the plains and foothills and die during the winter. Most of the first-brood pale green males remain behind during the spring on the plains and foothills, and probably die after the pasture vegetation becomes dry.

LATHROP (F. H.). **Observations on the Biology of Apple Aphids.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 436–440. [Received 13th January 1922.]

The observations here described on *Siphonaphis padi*, L. (*Aphis avenae*, F.), *Aphis pomi*, De G., and *A. sorbi*, Kalt., were carried out during 1915 and 1916 in Western New York and since 1917 in Western Oregon.

In Western New York *S. padi* is the predominant species. *A pomi* is the next most abundant, its numbers increasing in midsummer. It often causes severe injury to young plantations and the more succulent parts of mature trees. *A. sorbi* is the least numerous of the three, but owing to the fact that it causes malformation of the fruit, it is a serious pest wherever it occurs. It is the most common species in Western Oregon, where *S. padi* is rare on apple, although it occurs commonly on grains and grasses. *S. padi* is apparently not a conspicuous pest of apples in regions where, owing to climatic conditions, the winter can be passed on Graminaceae.

A. pomi occurs in greatest abundance in early summer in Western Oregon, but seldom causes severe injury. The hatching period of these Aphids is longer in Western Oregon than in Western New York. In the latter district *S. padi* began to hatch on the 22nd April, *A. pomi* four days later, while *A. sorbi* was intermediate between the two. In Western Oregon *A. pomi* hatches from 9 to 15 days later than *A. sorbi*. It was impossible to determine the exact date of hatching of *S. padi*, owing to its scarcity, but it certainly occurs from 10 to 15 days earlier than *A. sorbi*, making an interval of from 19 to

30 days between the hatching of *S. padi* and *A. pomi*. The period between the hatching of the first and last eggs shows a similar regional variation.

The most marked regional difference in reference to summer activities was the time of appearance of winged forms. In 1916 in New York the second generation of *S. padi* consisted entirely of winged individuals, which quickly disappeared from the apple. During experiments with *A. sorbi* in 1919, the cage was kept constantly moist, thus reducing the temperature, raising the relative humidity, and inducing the tree to continue a rapid and succulent growth. Wingless viviparous females were produced throughout the summer and were present until killed by frosts in late November. There was apparently no tendency to produce oviparous forms in the autumn, and there is no indication that this species could maintain its existence on apple alone for more than one season. *A. pomi* produced about 90 per cent. of winged forms in the second generation ; this is apparently characteristic of this species under the Eastern climatic conditions, as is also the scarcity of winged forms of later generations. In Western Oregon winged forms are not generally numerous in the second generation, the migratory forms occurring in larger numbers in the later generations than is the case in the East. The hibernation of *A. pomi* in Oregon is similar to that occurring elsewhere. *S. padi* passes the winter chiefly as viviparous females on grains and grasses, where growth and reproduction occur during the winter months, when the temperature is favourable. *A. sorbi* continues reproducing throughout the winter on plantain ; a few migrants are produced, which return to apple in the autumn. During the winter of 1919–20, this species withstood a temperature of —13° F. on plantains in the field protected by snow. These low temperatures are not withstood without protection. Winged forms occur in the spring and spread the infestation.

These regional variations in the behaviour of apple Aphids are of great significance to commercial fruit-growers, and must be taken into consideration when organising remedial measures. *A. sorbi* must be combated on plantain as well as apple if it is to be eradicated in Western Oregon. The failure of the delayed dormant spray of nicotine sulphate to control this species in Western Oregon is probably due to the long drawn out hatching period more than to any other factor.

Quayle (H. J.). **Life History of the Codling Moth in Walnuts at Santa Ana, California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 440–444. [Received 13th January 1922.]

The larvae of the codling moth [*Cydia pomonella*] hibernate in cocoons under the loose bark of walnut trees, in old cuts, under bands or in any such protected places. Pupation lasts from 18 to 30 days, and occurs from the beginning of April to the 19th June on walnuts, and about ten days earlier on apple. The moths emerged from walnut from the 24th April to the 30th June, and the first eggs were observed on the 8th May on pears, on the 12th May on apples, and on the 14th May on walnuts. Oviposition continues until early in July. The larvae hatch in from 10 to 20 days. The maximum emergence of larvae occurs during the second week in June on walnuts. These larvae try to enter at the calyx of the nut, but as the nuts harden, they enter at other points, especially where two nuts are in contact. An average of 35 days are spent in the nut, but some larvae were still found in them after 69 days.

The larvae of this brood pupate from the middle of June to the middle of July, spending from six days to several weeks in the cocoon. The first moths emerged on the 25th June and continued until the beginning of September. The broods begin to overlap, as the adults of the spring brood are still active. The adult life varies from 5 to 18 days. The first eggs of the second brood were observed on the 2nd July, the majority being laid during the first week in August. The larvae appear from early in July until about the second week in August; many of them pass the winter in this stage and only complete their development the following year. Some of them, however, pupate, the adults appearing from the last week in August until October. The eggs and larvae of this partial brood appear in September and October, and the larvae may enter the nuts as late as the second week in October. Larvae in various stages of development may be found in the harvested nuts.

De Ong (E. R.). **Cold Storage Control of Insects.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 5, October 1921, pp. 444–447. [Received 13th January 1922.]

The results of the experiments here described show that dried fruit stored at any temperature from 10° to 36° F. will be free from all injury by insects during the time of storage and, when removed at the end of the third or fourth month, all stages (with the exception perhaps of the egg) of *Plodia interpunctella*, Hb. (Indian meal moth), *Carpophilus hemipterus*, L. (dried fruit beetle), *Silvanus surinamensis*, L. (saw-toothed grain beetle), *Tenebroides mauritanicus*, L. (cadelle) and *Carpoglyphus passularum*, Hering (dried fruit mite), will be dead. The action of bacteria and fungi are also apparently suspended during storage at these temperatures. The mortality at temperatures of 45°–50° F. is very low. The cost of protection during the storage period is estimated at from 2·3 to 3·5 per cent. of the crop value as against from 6 to 18 per cent. during the growing season.

Jaenicke (A. J.). **Forest Insect Problems of the Pacific Slope.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 5, October 1921, pp. 447–450. [Received 13th January 1922.]

Dendroctonus brevicomis, Lec. (western pine beetle) and *D. monticolae*, Hopk. (mountain pine beetle) are the chief species damaging pine trees in the Pacific slope. *D. brevicomis* only attacks western yellow pine (*Pinus ponderosa*), whilst *D. monticolae* also kills sugar pine (*P. lambertiana*), western white pine (*P. monticola*) and lodge-pole pine (*P. contorta*).

The damage caused by these beetles is briefly discussed, and the present control work is reviewed. In a privately owned area in Southern Oregon, covering about 600,000 acres and valued at at least six million pounds, the loss due to *D. brevicomis* during the past ten years amounts to £600,000. This timber is surrounded by Federally owned forests, which are infested to the same degree. Control measures, to be effective, must therefore provide for the destruction of the beetle on private and government lands simultaneously. An emergency bill has recently been introduced in both Houses of Congress providing for the appropriation of over £30,000 for the extermination of these beetles on the Federal lands, and it is probable that within the next few years more money will be required to enable those

responsible for the protection of Federal timber to fight the epidemics of these bark-beetles in co-operation with private owners. The importance of continually enlarging and improving the present organisation for dealing with this matter is emphasised.

Burke (H. E.). U.S. Bur. Ent. **Biological Notes on *Desmocerus*, a Genus of Roundhead Borers, the Species of which infest various Elders.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 450–452. [Received 13th January 1922.]

The beetles of the genus *Desmocerus* belong to four western and one eastern species. These are *D. cribripennis*, Horn, *D. californicus*, Horn, *D. piperi*, Webb, *D. auripennis*, Chev., and *D. palliatus*, Forst. They all bore in the pith and wood of living shrubs or trees of various species of elder (*Sambucus*). The stems may not be killed by the mines, but the scars in the bark afford entrance to bacteria, fungi, and ants. The life-cycle occupies about two years. The eggs are laid in crevices of the bark or in the vicinity of wounds. Pupation and transformation to the adult take place during the second spring in a cell in the pith. The adults emerge about the time the elder is in bloom and may be found on the flowers and foliage.

The best method of collection is to cut into the stems just before the flowers open and remove the beetles from the pupal cells. The trees should be protected at the beginning of June by spraying the trunks with lead arsenate-miscible oil emulsion or some other ovicide.

European Corn Borer Conference.—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 453–455. [Received 13th January 1922.]

At a meeting held at Sandusky, Ohio, 15th September 1921, to consider the situation respecting the European corn borer [*Pyrausta nubilalis*] a committee was appointed to suggest recommendations as to the policy to be adopted in relation to national, State, local and individual control. The report of this committee was adopted at the final session at St. Thomas, Ontario, 17th September 1921.

As complete extermination is impossible, owing to the establishment of this moth over large areas, the policy adopted should be designed to check further spread as far as possible and to promote the speedy development of practical control measures. Quarantine measures are considered to be the most effective means of checking the spread. The adoption of a modified regional quarantine in New England is recommended, on account of the complex conditions due to the occurrence of two generations in that area, and it is suggested that the quarantine line should not be established further west than the Connecticut river. In infested areas where the borer produces only one generation a year, quarantine restrictions should be limited to all sorghums, maize, Sudan grass and broom corn. The closest possible co-operation in both quarantine and control work with the Federal authorities is urged. The authorities in infested States and Provinces are urged to make financial provision for co-operative work, as this may mean maximum participation on the part of the Federal Government.

The facilities for investigation and the introduction of parasites might be expanded. The satisfactory co-operation both in control and investigation between United States and Canadian officials was commented upon.

WHITEHOUSE (F. C.). **Entomological Report for 1920.**—*Ann. Rept. Dept. Agric. Alberta, 1920, Edmonton,* 1921, pp. 191–193. [Received 14th January 1922.]

Alberta experienced a very severe outbreak of grasshoppers in 1920, *Camnula pellucida*, Scud., and *Melanoplus atlantis*, Riley, being responsible for 90 per cent. of the damage. *M. bivittatus*, Say, *M. packardi*, Scud., and *Dissosteira carolina*, L., were also unusually abundant. Cantharid and Bombyliid larvae feeding on the eggs were fairly numerous in the extreme south, but further north no enemies were found.

Euxoa ochrogaster, Gn., was rarely present in destructive numbers, probably owing to heavy parasitism in 1919 by the Hymenopteron, *Amblyteles suturalis*, and Tachinids. Grain crops were severely damaged by *Porosagrotis orthogonia*, Morr. *Euxoa tristicula* was taken in numbers in the autumn from summer fallow, but over 33 per cent. of the hibernating larvae were killed in the spring by the Chalcid, *Berecyntus bakeri*, How., of which an average of 824 adults were bred from every parasitised larva. A most widespread outbreak of *Loxostege sticticalis*, L., occurred. In early June the adult moths were very abundant, and eggs were frequently found on *Chenopodium album*. In the middle of July larvae of the first generation appeared in unprecedented numbers. The outbreak, however, was, on the whole, beneficial, as many fields contained more weeds than wheat, with insufficient moisture to develop this multiple crop. The webworms devoured the weeds, scarcely touching the crops. The second generation of moths exceeded anything previously experienced. Rains in July caused a growth of weeds on which many eggs were deposited, but a subsequent drought dried them up. Larvae of *Cephus occidentalis*, R. & M., were recorded for the first time injuring mature wheat stems.

Other pests included :—*Peranabrus scabricollis*, Thom. (Coulee cricket), *Gryllus pennsylvanicus*, Burm., *Pteronus ribesii*, Scop., *Plutella maculipennis*, Curt., and *Leptinotarsa decemlineata*, Say, which was abundant on wild tomatos, but not exceptionally numerous on potatoes. The Noctuid, *Rhynchagrotis placida*, Grote, was bred from larvae collected on poplars.

TILLYARD (R. J.). **The Hawthorn Hedge Menace.**—Reprint from *Nelson [N.Z.] Evening Mail*, 31st December 1920 & 4th & 5th January 1921, 7 pp. [Received 16th January 1922.]

Hedges formed of hawthorn [*Crataegus*] are a very serious menace in New Zealand, because this plant is the intermediate host of fire blight [*Bacillus amylovorus*], and is also the food-plant of many noxious insect pests. The life-history and habits of various pests of orchard trees are recorded, and in each case the remedial measures adopted would be sufficient to control them if the hawthorn, which cannot be easily sprayed with arsenicals, were not an alternative food-plant. The New Zealand pests given as examples include: the pear tree sawfly [*Eriocampoides limacina*], codling moth [*Cydia pomonella*], oyster-shell scale [*Lepidosaphes ulmi*], San José scale [*Aspidiotus perniciosus*], and the small yellow leaf-hopper.

The author advocates that all hawthorn hedges should be clipped to a height of 4 ft., as this would prevent them from flowering and thus

attracting insects. Experiments should be undertaken to singe the hedges so as to destroy all pests, and yet permit them to recover and make new growth.

COBB (N. A.). *Howardula benigna*; **a Nema Parasite of the Cucumber Beetle.**—*Science, Garrison-on-Hudson, N. Y.*, liv, 30th December 1921, no. 1409, pp. 667–670, 4 figs.

The Nematode, *Howardula benigna*, here described infests the body cavity of *Diabrotica vittata*, F., and *D. trivittata*, Mann. Parasitised beetles are smaller and less vigorous than healthy ones, and infested females are less fertile. As many as 30,000 Nematodes have been removed from one individual.

Infestation by this species ranges up to 70 per cent., with an average of about 20 per cent. Its distribution in 1921 was probably nearly coextensive with that of the two Coleopterous hosts.

CLAASSEN (P. W.). **Typha Insects: their Ecological Relationships.**—*Cornell Univ. Agric. Expt. Sta., Ithaca, N. Y.*, Memoir 47, October 1921, pp. 457–531, 9 tables, 11 plates. [Received 18th January 1922.]

The first part of this paper deals with the ecology of the cat-tail plant. The second part reviews the life-history and biology of the insect inhabitants, some of which are of considerable economic importance The third part endeavours to bring out their true ecological relationships, grouping the insects with reference to the part of the plant they affect, their relative importance and their interrelations.

DUSHAM (E. H.). **The Painted Hickory Borer,** *Cyllene caryae*, **Gahan.**—*Cornell Univ. Agric. Expt. Sta., Ithaca*, Bull. 407, August 1921, pp. 171–203, 2 plates. [Received 18th January 1922.]

Previous literature on the classification, history, synonymy, distribution and food-plants of *Cyllene caryae*, Gah. (painted hickory borer), is reviewed. This Cerambycid is capable of causing considerable damage. It only attacks felled timber and dead standing trees, and prefers small trees and branches to large trunks The most serious injury is due to the pupal cells, which penetrate into the larger trunks for one or two inches, and into the smaller branches to the heart-wood. The sap-wood of the hickory, the most valuable part of the tree to the manufacturer, is riddled by the larval galleries. This beetle also damages black walnut and osage orange [*Maclura aurantiaca*].

Mating occurs soon after emergence, and oviposition usually takes place within a short period. The eggs are laid in crevices or under the scales of the bark. The maximum number deposited by a single captive female was 56. They hatch in 6–10 days. The larvae migrate under the scale of the bark and begin to burrow. They mature in 10–12 weeks, then gnaw a large oval-shaped hole through the bark to the exterior, where they pupate. The pre-pupal stage varies with temperature and humidity and may last 25–63 days. Experimentally pupation began at the end of August, and by the end of November all were in the pupal stage. In the field the winter is passed in this stage. The adults emerge in the spring. A full description is given of all stages.

The natural enemies are reported to be Elaterid larvae (*Hemirhipus fascicularis*, F.), *Bracon erythrogaster*, Brullé, and *Doryctes radiatus*, Cr. The author found *B. erythrogaster* ovipositing in numbers in the galleries of this insect. A small Eumenid wasp constructs its nest outside the pupal cell, and so prevents parasites from gaining access to the pupae.

The remedial measures recommended are the felling of all standing dead timber as soon as possible, and if not used at once the logs should be barked or put in water. Unbarked logs, poles and similar material should never be left during the dangerous season, from May to August. Infested material which cannot be utilised, and all rubbish, should be burned before the beetles can emerge. The destruction of *Crataegus* near tracts of hickory would be beneficial.

RIVIÈRE (C.). *Saccharum spontaneum*.—*C.R. Acad. Agric. France, Paris*, vi, no. 38, 15th December 1920, pp. 912-916. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no 2, February 1921, pp. 187-188.) [Received 13th January 1922.]

The cultivation and uses of *Saccharum spontaneum*, used for its fibre, are discussed. This plant is gradually spreading in the eastern basin of the Mediterranean, and is found in small patches in the neighbourhood of Bône, Algeria. It is subject to attack by the Noctuid moth, *Sesamia vuteria*, Stoll (*nonagrioides*, Steph.), and should not be grown near vineyards, as *S. vuteria* is a very serious pest of vines.

PAILLOT (—). **Sur un Parasitè nouveau des Plantations de Pêchers dans la Vallée du Rhône.**—*Progrès Agric. et Vitic., Montpellier*, lxxvii, no. 3, 15th January 1922, pp. 69-71.

The peach orchards in the Rhône Valley are threatened by the ravages of the sawfly, *Neurotoma nemoralis*. It had previously occurred in certain limited areas, but is now rapidly spreading. The area infested in 1921 was almost five times that of the previous year. The adults are in flight towards the end of April, the main egg-laying period occurring about 10th May. The eggs hatch in from 6 to 8 days, according to the temperature. The larvae are mature in about a fortnight and enter the soil, where they hibernate.

Sprays with a basis of nicotine or quassia are advocated against this pest. Hellebore is also fairly efficacious. In severe infestations two sprayings are necessary, applied with an interval of five or six days. The first spray should be applied as soon as the first larvae appear. During the present experiments the formulae used were: $1\frac{1}{3}$ gal. nicotine (at 1 lb. to the gallon), 20 lb. soft soap and 100 gals. water; 10 lb. quassia (chips), 15 lb. soft soap and 100 gals. water; and $12\frac{1}{2}$ lb. white hellebore (root), 1 lb. gelatine and 100 gals. water.

FLURY (F.) & HASE (A.). **Prüfung von Pflanzenschutzmitteln.** [The Testing of Substances for Plant Protection.]—*Mitt. deutsch. landw. Ges.*, 1920, pp. 605-606. (Abstract in *Centralbl. Bakt. Paras. Infekt, Jena*, IIte Abt., lv, no. 14-20, 18th January 1922, p. 368.)

A department for testing preparations sold for plant protection has been established at the Imperial Biological Institute for Agriculture and Forestry in Berlin-Dahlem. The formulae must be communicated

in confidence, but only those materials are tested for which the maker submits working instructions. The results are published in the case of materials already on the market; in the case of new ones, the publication of results may be withheld at the request of the maker.

Riehm (E.). **Die Regelung des Handels mit Pflanzenschutzmitteln.** [The Regulation of Trade in Substances for Plant Protection.]—*Angew. Bot.*, ii, 1920, pp. 302–308. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, p. 368.)

Existing legislation with regard to insecticides and other substances used in plant protection in the United States, Switzerland, Denmark and Saxony are compared. The author does not approve of clauses requiring the publication of formulae (often the result of prolonged experiments), or of the fixing of a maximum price, as costly research would be hindered thereby.

Sertz (H.). **Ueber die Wirkung von Fluorwasserstoff und Fluorsilizium auf die lebende Pflanze.** [The Action of Hydrogen Fluoride and Silicon Fluoride on the living Plant.]—*Tharandt. forstl. Jahrb.*, lxxii, 1921, pp. 1–13. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, p. 373.)

Experiments show that hydrogen fluoride and silicon fluoride are quite unsuitable for use in fumigation, as they are very injurious to living plants.

Wilhelmi (J.) **Zur Ausgestaltung der Schädlingsbekämpfung.** [On the Full Development of Work against Pests.]—*Naturw. Wochenschr.*, N.S. xx, 1921, pp. 312–316. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, pp. 395–396.)

Salient points in the work of combating insect pests in Germany are the founding of the German Society for Applied Entomology, in 1913, the work of the Technical Committee against Pests, which was attached to the Ministry for War, and the establishment of the German Company for Combating Pests. The present position is discussed. It is very desirable that such facilities as exist should be enlarged, and a plan is given on the lines of which it is suggested that measures should be organised in Germany.

Neumeister (—). **Nonnengefahr für Sachsen.** [The Nun Moth Danger in Saxony.]—*Tharandt. forstl. Jahrb.*, lxxii, 1921, pp. 62–64. (Acstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, p. 408.)

In view of the prospective danger of an outbreak of the nun moth [*Liparis monacha*], which was abundant in some districts of Saxony in 1920, official counts must be made of eggs on four or five felled trunks in every 2½ acres. Remedial measures are obligatory if more than 100 eggs are found on a spruce trunk, and 150 on pine.

REICHLING (—). **Die Buchenwollaus,** *Cryptococcus fagi,* **Bärenspr., in Westfalen sowie über ihre Bekämpfung.** *[The Beech Scale, C. fagi, in Westphalia and its Control.]—Jahresber. westf. Provinzialver. f. Wiss. u. Kunst., Münster, no. 47–48, 1920, pp. 15–17.* (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., lv, no. 14–20, 18th January 1922, p. 415.)

From 1909 to 1914 *Cryptococcus fagi,* Bär., was abundant in the Sauerland district; no important outbreak has been observed in the flat portion of Westphalia in recent years. This scale prefers soft-barked trees and is more abundant in the interior of a beech stand than at the edges. The trees are seldom killed by *C. fagi* itself, but infestation by the scale renders them susceptible to other enemies and diseases. Injured trees are attacked by *Xyloterus* (*Tomicus*) *domesticus, Lymexylon dermestoides,* and a fungus, *Nectria ditissima.* Painting with a nicotine-resin-soap mixture gives good results.

GESCHWIND (—). **Die in den Schwarzkiefernsaatkämpen des Karstes auftretenden schädlichen Insekten und Pilze sowie die Mittel zu ihrer Abwehr.** [The Injurious Insects and Fungi occurring in Black [Austrian] Pine Nurseries in the Karst Region and Methods for combating them.]—*Wien. allgem. Forst- u. Jagdzeitg,* xxxix, 1921, pp. 29–30. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., lv, no. 14–20, 18th January 1922, pp. 418–419.)

Afforestation in the Karst region is chiefly effected with two-year-old seedlings of Austrian pine grown in permanent or temporary nurseries. The usual pests found in Central European forests occur and injure both the seedlings and the two-year-old plants. To guard against them the spaces between the seed drills are covered with strips of turf sods, cut so as to be triangular in section, and turned upside down; the drills are about $\frac{4}{5}$ inch from the edges of such strips on either side, so that the plants are in a sort of gutter, the sloping sides of which are formed by the sods. As these sides harden cockchafers [*Melolontha*] no longer oviposit on them and the seedlings in the drill are so close that these pests cannot creep in. Mole-crickets abandon such nurseries because they are unable to make their sloping galleries there. The fungus, *Fusarium,* does not attack plants where the lowest air strata are in motion, a condition which exists in nurseries arranged as here described.

BARBEY (A.). **Die Rindenlaus der Weisstanne.** [The Bark Louse of the Silver Fir.]—*Schweiz. Zeitschr. Forstw.,* lxxii, 1921, pp. 147–151, 1 plate (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena,* IIte Abt., lv, no. 14–20, p. 420.)

Chermes (*Dreyfusia*) *piceae,* C.B., said by Nüsslin to be only a form of *C.* (*D.*) *nüsslini,* C.B., has no summer larvae on the needles, and no sexual generation; the spring migrants produce latent larvae and wingless females. There are no stem-mothers. In 1920, silver firs, 40–80 years old, in both mixed and unmixed stands in the forests of Argovie, Switzerland, died as a result of the drying of the wood following splitting of the bark; this was probably due to the abstraction of sap by the larvae. The remedy advised is spraying with a solution containing 1,400 parts water, 30 nicotine, and 100 soap. If the Aphids are not too high up in the crown, the larvae may be scrubbed off.

SIHLER (—). **Die Gespinstmotte,** *Hyponomeuta euonymellus*, **und ihre Tätigkeit als Papiermacherin.** [*H. euonymellus* and its Work as a Paper Maker.]—*Jahresber. Ver. f. vaterl. Naturk. i. Württemberg*, lxxvi, 1920, Sitz.-Ber., pp. 24–27.

STEHLI (—). **Die Gespinstmotten.** [The Web Moths.]—*Kosmos*, 1921, p. 25. (Abstract in *Centralbl. Bakt. Paras. Infekt*, *Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, p. 421.)

In cases of severe infestation by *Hyponomeuta euonymellus* the web in which the entire tree is wrapped resembles paper and does not tear easily. Hymenopterous parasites and the Tachinid, *Prosopodes fugax*, are important enemies of this moth, and the destruction of the webs entails that of *P. fugax*, which is a parasite of the second generation of the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] [*R. A.E.*, A, v, 97]. In vine-growing districts the planting of *Euonymus* should be encouraged.

FABER (F.), FISCHER (G.) & KALT (B.). **Die biologische Bedeutung des Rapsglanzkäfers für Raps, Rübsen und Senf.** [The biological Importance of the Rape Weevil on Rape, Turnip and Mustard.]—*Landw. Jahrb.*, 1920, pp. 681-701, 5 figs, 1 plate. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, *Jena*, IIte Abt., lv, no. 14–20, 18th January 1922, p. 452.)

The authors' investigations show that the larvae of the rape weevil [*Meligethes aeneus*, F.] only favour the fertilisation of plants inasmuch as they distribute the pollen when moving about. The adults, both of the first (hibernated) and second generations, may favour self-fertilisation. On the other hand, the adults of the second generation injure the reproductive organs, especially when they appear at the time that the chief blossoming period of Cruciferous plants occurs.

URBAN (C.). **Die Nahrungspflanzen der** *Ceuthorrhynchus*. [The Food-plants of *Ceuthorrhynchus*.]—*Ent. Blätter*, *Berlin*, xvii, no. 1 3, 30th March 1921, pp. 19-22. [Received 17th January 1922.]

The food-plants of over 100 species of *Ceuthorrhynchus* and a few other weevils are given in this paper.

EGGERS (H.). **Seltene und neue paläarktische Borkenkäfer.** [Rare and New Palaearctic Bark-beetles.]—*Ent. Blätter*, *Berlin*, xvii, no. 1–3, 30th March 1921, pp. 39–43, 1 fig. [Received 17th January 1922.]

Cryphalus pini, sp. n., is described from Kiaochow in *Pinus densiflora*; it somewhat resembles *C. redikorzevi* [*R. A.E.*, A, v, 511]. *Ips tridentatus*, sp. n., from the Taurus, is related to *I. erosus*, Woll.

Though pines are common in Germany, *Ips longicollis*, Gyll., is known to the author only from Alsace and Silesia. The reason for this peculiar distribution lies in the fact that infestation is apparently confined to large, standing trunks that have begun to die. *I. longicollis* has never been found in small trunks or in those lying on the ground, even where such timber is abundant and infested by *I. sexdentatus*, *I. proximus*, *I. laricis* and *I. acuminatus*. In German forests such large, valuable timber is not allowed to die gradually, so that conditions favourable to *I. longicollis* are not created.

DORN (—). *Sitodrepa panicea* **als Kofferschädling.** [*S. panicea* as a Pest of Trunks.]—*Ent. Blätter, Berlin,* xvii, no. 1–3, 30th March 1921, p. 45. [Received 17th January 1922.]

A case is recorded of *Sitodrepa panicea* infesting a leather trunk and boring in those portions where paste had been largely used.

SPEYER (W.). **Beitrag zur Biologie des gefleckten Kohltriebrüsslers** (*Ceuthorrhynchus quadridens*, **Panz.**). [A Contribution to the Biology of *C. quadridens*.]—*Ent. Blätter, Berlin,* xvii, no. 7–9, 28th September 1921, pp. 118–124, 1 fig., 1 plate. [Received 17th January 1922.]

In the course of investigations on the pests of rape crops in the Naumburg district [*R.A.E.*, A, ix, 547] the author found *Ceuthorrhynchus quadridens*, Panz., to be the most injurious of the rape weevils, and the harmfulness of this species is insufficiently recognised in Germany.

C. quadridens hibernates among fallen leaves in woods and thickets, and it appears about mid-March on Cruciferous plants, including *Alliaria*, *Lepidium*, cabbage, rape, radish, and occasionally white mustard. By the end of March it is breeding on the cultivated varieties of these, except on the last named. Eggs, up to six in number, are laid in a puncture in the underside of a leaf-stalk or in the plant-stem, usually just beneath a leaf-stalk. The oviposition period extends up to the end of June. The larvae hatch in five or six days. When mature, the larva bores through the plant-tissue and migrates to the ground, where it pupates. From egg to adult development requires about twelve weeks, the first adults appearing in mid-June, whereas in the case of *C. assimilis* the life-cycle occupies only six weeks. The adults are not seen in any abundance, so that it is supposed that they aestivate after feeding for a short period and pass without a break from aestivation to hibernation. In spring the adults attack the leaves and, preferably, the leaf-stalks and plant-stems The new generation of adults feeds in a similar manner, but the older plants are not affected to the same degree, and as feeding is not prolonged this attack is negligible. Attacks by the larvae are the most harmful and consist in hollowing out the stalks, with the result that the plants wither or break in a wind. *C. quadridens* occurs in various parts of Germany and is probably more widely distributed there than is usually supposed. Its larva is sometimes mistaken for that of *Psylliodes chrysocephala* or of *Baris* sp., but its feeding habits distinguish it from the latter. A Hymenopterous parasite, of which only the larvae have been observed, infests *C. quadridens* from March to June, but the check effected by it is unimportant.

Remedial measures have not yet been worked out, but collection is suggested.

FEHSE (—) *Monochamus galloprovincialis* **var.** *pistor*, *Saperda perforata*, *Saperda similis*.—*Ent. Blätter, Berlin,* xvii, no. 10–12, 26th December 1921, pp. 196–197.

Monochamus galloprovincialis var *pistor* is probably the chief representative of its genus in the coniferous forests of North and Central Germany. In Lithuania it was found in stout pine branches. Other species observed in Lithuania are *M. sutor*, abundant in thin

branches of spruce, and *M. quadrimaculatus* in thick stems of spruce. All three beetles, however, occur only in freshly felled timber in bright sunshine.

Saperda perforata is quite common in aspen (*Populus tremula*) in the marshy forests of Lithuania, where the adult emerges from the end of May to early July. The author has also noticed this beetle on the borders of the Harz region. *S. similis* also occurs there, in *Salix caprea*.

Nutzen der Klebringe an den Obstbäumen. [The Uses of Adhesive Bands on Fruit Trees.]—*Schweiz. Zeitschr. Obst- u. Weinbau, Frauenfeld,* xxxi, no. 1, 14th January 1922, pp. 9–10.

This article emphasises the value of banding in protecting fruit-trees against the winter moth [*Cheimatobia brumata*, L.] and the apple-blossom weevil [*Anthonomus pomorum*, L.] and gives directions as to the date of application, etc., suited to conditions in Swiss fruit-growing districts.

Serviço de Inspecção e Defesa Agricola. [Service of Inspection and Agricultural Defence.]—*Bol. Agric., S. Paulo,* xxi, no. 7–11, July–November 1920, pp. 448–570, 59 figs., 3 plates. [Received February 1922.]

Among the reports in this section is one by G. Lopes, describing a journey to Montevideo for the purpose of studying methods of distributing *Novius cardinalis* as a control for *Icerya purchasi*, which is troublesome in San Paulo. Another report, by C. Godoy, describes a visit to Portici, Italy, with the object of studying *N. cardinalis* and obtaining supplies of this Coccinellid. An article by F. C. Camargo describes the life-history of *I. purchasi* in the United States and gives a list of the plants attacked.

An entomological report for 1919 by C. H. T. Townsend records the three most important pests as *Platyedra* (*Pectinophora*) *gossypiella*, Saund. (pink bollworm), *Atta sexdens*, L. (leaf-cutting ant) and *Icerya purchasi*, Mask. (fluted scale). Other pests observed during 1919 include a weevil, *Gasterocercodes gossypii*, infesting cotton.

Lopes (G.). **Uma Praga do Pessegueiro. Como a** *Prospaltella berlesei* **terminou com o** *Diaspis pentagona*. [A Pest of the Peach Tree. How *P. berlesei* exterminated *D. pentagona*.]—*Bol. Agric., S. Paulo,* xxi, no. 12, December 1920, pp. 730–740, 12 figs. [Received February 1922.]

This is an account of the eradication of the mulberry scale, *Diaspis pentagona*, in the Brazilian State of San Paulo, by means of *Prospaltella berlesei*.

Averna-Saccá (R.). **Algumas Molestias novas e outras pouco conhecidas da Batatinha** (*Solanum tuberosum*). [Some new and other little known Diseases of the Potato.]—*Bol. Agric., S. Paulo,* xxi, no. 12, December 1920, pp. 741–812, 28 figs. [Received February 1922.]

The only pest of potatoes mentioned is the mite, *Rhizoglyphus echinopus*, F. & R., which also infests cassava. When gathering the crop all infested tubers must be burned, or, if the infestation is slight, they may be kept for three or four hours at a temperature of

45°–50° C. [113°–122° F.]. The ground may be fumigated with carbon bisulphide or formol, or it may be burnt over. The tubers should be washed with a solution of potassium sulphide, 1 oz. in 3 gals. water, and this is also valuable against the fungi accompanying this Acarid.

TOWNSEND (C. H. T.). **[Report on Entomological Work in 1920 in the State of S. Paulo.]**—*Bol. Agric., S Paulo,* xxii, no. 1–2, January–February 1921, pp. 17–20. [Received February 1922.]

The first shipment of *Novius* (*Vedalia*) *cardinalis* to reach S. Paulo was obtained from South Africa. This was followed by collections from Italy and Uruguay, and this Coccinellid being now firmly established, the fluted scale, *Icerya purchasi*, Mask., will soon be eradicated. Parasitic flies have been studied, especially with a view to checking *Atta sexdens* and the pink bollworm [*Platyedra gossypiella*, Saund.]. There appears to exist in Brazil a fly very similar to *Tortriciophaga tortricis*, which parasitises *P. gossypiella* in the United States and Mexico. A pest that first appeared in small numbers, but has spread among maize and cotton, is a bug, *Nysius simulans*.

TOWNSEND (C. H. T.). **A Formiga Saúva.** [*Atta sexdens*, L.]—*Bol. Agric., S. Paulo,* xxii, no. 3–4, March–April 1921, pp. 58–73. [Received February 1922.]

This is a popular account of *Atta sexdens*, L., which is a very injurious ant in Brazil, and of the measures advocated against it. The best results are obtained with fumigation, for which purpose hydrocyanic acid is considered to be the most efficient agent.

Uma Cochonilha da Herva Mate, *Ceroplastes* **sp.** [A Scale, *Ceroplastes* sp., attacking the Maté Shrub.]—*Chacaras e Quintaes, S. Paulo,* xxiv, no. 6, 15th December 1922, pp. 467–468, 1 fig.

A scale belonging to the genus *Ceroplastes* has been discovered attacking the maté shrub [*Ilex paraguensis*] in the Brazilian State of Paraná. Spraying with kerosene soap emulsion is the remedy advocated, an alternative being scrubbing the infested parts with soap solution. If the scale increases rapidly, it will be necessary to cut down and burn the infested plants.

C. V. **Contro la Tignuola dell' Uva.** [Against the Vine Moth.]—*Riv. Agric., Parma,* xxvii, no. 2, 13th January 1922, pp. 21–22.

In the districts around Parma the vine moth [*Sparganothis pilleriana*] pupates about 15th July, the adults appearing ten or twelve days later. Oviposition occurs in the following fortnight, and the larvae hatch about 20th August and hibernate, feeding again in spring. In dry weather hot water may be poured on the stocks when the vines begin to bud, as at that time the larvae are issuing from their winter quarters. The pupae may be asphyxiated with sulphurous acid or with a mixture of water and hydrochloric acid. The stocks should be scraped, the old bark being burned. Other measures include working the soil, removal of the leaves near the grapes, and spraying (up to August) with a lime-copper solution to which arsenious acid or sodium arsenite has been added.

Marcucci (E.). **Osservazioni sulla Forma esterna e sulla Biologia della Larva di "*Acanthoscelides obtectus*, Say."** [Observations on the External Structure and Biology of the Larva of *Bruchus obtectus*.]—*Arch. Zool., Naples*, ix, no. 2, 1920, pp. 237–262, 19 figs. [Received 18th January 1922.]

The work hitherto done has been chiefly directed to the injury caused by, and the remedies against, *Bruchus* (*Acanthoscelides*) *obtectus*, Say. The larva does not infest beans only, many other seeds being attacked, provided they are quite mature. Seeds with an oil content are injurious to the larva, though apparently it cannot distinguish between suitable and unsuitable varieties, merely preferring those that are easy to penetrate. Within the bean the larva moults three times and then builds the pupal cell. After remaining in the cell for some time the larva moults for the fourth time and transforms into the pupa.

Six annual generations are possible in the region around Naples. The first adults of the winter generation appear at the end of April and oviposit, thus giving rise to the first generation, the development of which occupies about 45 days. Towards the end of July the adults of the second generation are ovipositing. The third generation, which develops very rapidly, is the one that attacks mature beans still on the plants, and is introduced with them into the store-rooms. At the end of August the first larvae of the fourth generation may be observed. This generation develops more slowly than the preceding one, so that some late pupae are present in mid-October. The adults of the fifth generation begin to appear at the end of November and emergence is very slow, continuing up to January. Many larvae and adults die owing to the low temperature at this time. Only the adults that first emerge deposit eggs, and many of these do not hatch, while the larvae hatched last are incapable of perforating beans. The adults of the sixth generation do not appear until the end of April.

The author's observations as to the number of generations do not agree with those of other observers, but the difference is certainly due to climatic conditions, the number being greatest in a warm climate. In the hot months the adult lives about 10 days, whereas in cooler months it may survive for 20 days. The adult of the fifth generation, however, can remain alive for two or three months.

Trägårdh (I.). **Skogsinsekternas Skadegörelse under År 1918.** [The Injuries caused by Insects to Swedish Forests in 1918.]—*Medd. Stat. Skogsförsöksanst., Stockholm*, xviii, no. 6–9, 1921, pp. 281–314, 15 figs. (With a Summary in German.)

Much damage was done by *Pissodes pini*, L., in Schonen, and this was found to be due to the fact that thinning had been neglected at the proper time, thus providing increased breeding facilities. Timely thinning is therefore a preventive against this beetle. A study of *P. notatus*, F., showed the correctness of Lagerberg's view that only dying or dead trees are attacked. Only 5 per cent. of the dead trees were infested, which is here explained as probably due to only these being in a suitable condition in July and August, when *P. notatus* is breeding. The infested trees had been previously attacked by a fungus, *Dasyscypha fuscosanguinea*, and as *P. notatus* breeds in unhealthy trees only, its occurrence is a consequence of the attack by the fungus, which it may, however, spread in the course of feeding. *Magdalis*

violacea, L., was never found breeding in trunks used for traps; its larval mines occur in 3–6 year old twigs in the upper portion of pine crowns, the pupal chambers being at the surface. This marked specialisation of *M. violacea* results in its seldom playing a dangerous part, owing to its breeding opportunities being so limited. Whereas an attack by *P. pini* involves the presence of unhealthy trees, that of *M. violacea* depends on the presence of tops and branches that have been left on the ground. The only instance of an extensive infestation by *M. violacea* was seen in a thinned stand of *Pinus montana*, all the branches on the ground being infested. *Pityogenes bidentatus*, Hbst., and *Pogonochaerus fasciculatus*, DeG., also depend on the presence of clearings where tops and branches are lying near to the growing trees.

Cidaria dilutata, Thnbg., is a periodic pest in the birch zone of the Scandinavian mountains. In 1918 it appeared in eight Swedish districts This periodicity can only be explained by assuming that in these districts certain checks on the moth had been removed. Such checks are represented by an ant, *Formica rufa*, and by parasites, of which *Rhogas circumscriptus*, Nees, and *Itoplectis alternans*, Grav., var. *kolthoffi*, Auriv., were bred by the author from larvae of *Cidaria*. They are distinctly polyphagous and should therefore be numerous in regions where many hosts occur. If, however, *C. dilutata* is the only host in the Scandinavian birch zone, the parasites must be few in number, and therefore unable to check an outbreak of this moth at its outset. The absence of *F. rufa* and of alternative hosts of the parasites of *C. dilutata* probably accounts for the outbreaks of the latter. A warm spring and a warm autumn appear to be contributory factors. *Gelis alternans*, Thnbg., var. *petulans*, Först., and *G. instabilis*, Först., were also bred, but are certainly hyperparasites.

SPESSIVTSEFF (P.). **Bidrag till Kännedomen om Splintborrarnas Näringsgnag.** [A Contribution to the Knowledge of Feeding by the young Adults of European Scolytids.]—*Medd. Stat. Skogsförsöksanst., Stockholm*, xviii, no. 6–9, 1921, pp. 315–326, 5 figs. (With a Summary in German.)

The feeding done by young adult Scolytid beetles is either ignored or little recognised in European text-books. It is only lately that notes on the subject have appeared. Wichmann has observed this phenomenon in *Scolytus* (*Eccoptogaster*) *laevis*, *S.* (*E.*) *pruni* and *S.* (*E.*) *pygmaeus*, and Gornostaev believes that the rosette-like mines of young *S. rugulosus* are due to this cause.

In 1921 the author was able to confirm Wichmann's observations on *S. laevis*. On emerging from the deep-lying pupal chamber the young beetles come out of the wood, resembling in this respect *Myelophilus minor* and *Hylesinus fraxini*. The young individuals of *S. laevis* are, however, externally similar to older ones. The duration of feeding by the young beetles is short, lasting four or five days only in warm, sunny weather. The manner in which this is done varies considerably. Usually it is the green shoots that are attacked, a mine about ¾ cm. long being bored inside them. Sometimes even the leaf-stalks are destroyed, and thicker twigs may also be attacked in the same way. These injuries resemble those found in hickory and due to *S. quadrispinosus* in America. The female genitalia are not mature

until this feeding has taken place, and it is therefore indispensable for development. The shortness of the period is due to the fact that in the case of *S. laevis* the immaturity is not great.

An exact morphological and biological study of the other species of the genus *Scolytus* is necessary before the significance, cause and duration of this feeding can be ascertained.

Einschleppungsgefahr von Getreidekapuzinern und argentinischer Ameise. [The Danger of the Importation of *Rhizopertha dominica*, F., and *Iridomyrmex humilis*, Mayr.]—Reprint from *Mitt. Deutsch. Landw.-Ges.*, 1920, no. 48, 1 p.

During the war, stocks of cereals that accumulated in Australia and Argentina were severely infested by various pests. According to a report of the Marseilles Colonial Institute, Australian wheat was particularly badly infested with *Rhizopertha dominica*, F., and there was a danger of French mills and stores being affected. The Imperial Biological Institute in Berlin investigated the question of the possible extension of such a danger to Germany, and it is stated that there is no evidence of any extensive importation of *R. dominica* into France. Another pest, the Argentine ant, *Iridomyrmex humilis*, Mayr, has become a serious menace in the south of France, but owing to its requirements as regards warmth, it is not likely to be an outdoor pest in Germany, though plants under glass may suffer should it be introduced

ESTALILLA (H.). **The Atis Moth Borer,** *Heterographis bengalella*, **Rag.** (Abstract.)—*Philippine Agric., Los Baños*, x, no. 4, November 1921, p. 169.

Heterographis bengalella, Rag., is a serious pest of atis [*Anona squamosa*] at Los Baños. It is fairly well distributed throughout the Philippines, attacking also *Anona muricata* and other fruits of this genus. It is also recorded from India. The eggs are laid singly or in groups of two or three in the sutures and on the stems of the fruit, rarely on the leaves. They hatch in from four to five days. The larvae bore at once into the fruit and continue making fresh tunnels in it. They are mature in from 12 to 19 days after hatching, and pupate in the tunnel near the epidermis of the fruit. The moths emerge 12 days after pupation. The principal remedial measures are collection and burning or burying of the attacked fruit, which may be recognised by the presence of frass on the surface.

FLETCHER (T B.). **Report of the Imperial Entomologist.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1920–21, Calcutta*, 1921, pp. 41–59, 1 table, 6 plates. [Received 18th January 1922.]

Continued investigation of borers in sugar-cane and other Graminaceous plants was the principal work undertaken during 1920–21. Thin varieties of cane appear to have a greater immunity to attack than thick ones.

A severe attack of Aphids on an experimental crop of wheat was checked in a few days by liberating large numbers of Coccinellid beetles. An attack of red spider on jute was controlled by spraying with crude oil emulsion and sulphur. Many adult females of the scale, *Monophlebus octocaudatus*, were found in April on peach trees,

and eggs and dead females were found in June in the soil round the trunks within a radius of six feet; in the case of dry soil they occurred to a depth of three inches. Experiments are in progress on the survival of the eggs under various conditions.

The following pests were noted as occurring in destructive numbers: *Epilachna dodecastigma* on seedling egg-plants, *Diacrisia obliqua* on jute, soy beans, *Dolichos lablab*, and cowpeas, *Euphalerus citri* on orange and lemon, *Bagrada picta* on radish, and *Hellula undalis* and *Chrotogonus* sp. on cauliflower and seedling egg-plants.

Brief notes are given on the following insects: *Laphygma exigua*, found on various new food-plants, including *Colocasia antiquorum*, *Ranunculus scleratus*, *Polygonum glabrum* and *Rumex maritimus*; *Prodenia litura*, found on *Polygonum glabrum*; Agromyzid larvae mining the leaves of *Inula vestita*, *Cnicus arvensis*, *Nepta rudinalis*, *Pisum arvense*, and *Brassica campestris*; and larvae of *Stromatium barbatum* boring in dead wood, which were hatched in June 1917 and were still living two years later. *Exelastis pumilio*, Z. (*liophanes*, Meyr.), was reared from a larva found on a wild vetch. An Anthomyiid fly was found boring in the larval stage in *Imperata arundinacea*, causing dead-heart; the adults emerged in November. *Olenecamptus bilobus* was reared in November from larvae found boring under the bark of a fallen tree (*Ficus glomerata*). This beetle is at times a pest of cultivated figs. *Acrocercops syngramma*, Meyr., was reared from larvae mining leaves of mango.

FLETCHER (T. B.). **Additions and Corrections to the List of Indian Crop Pests.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 14–20.

In this further instalment of the list of Indian crop pests [*R.A.E.*, A, ix, 68] sixty additional species are dealt with.

BALLARD (E.). **Additions and Corrections to the List of Crop Pests in South India.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 21–28, 1 plate.

This paper deals with certain pests enumerated in a list of Indian pests already noticed [*R.A.E.*, A, ix, 68]. The weevil, *Pempheres affinis* seems to be widely distributed in cotton areas, and is being studied. It breeds freely in *Corchorus olitorius*, in two species of *Abutilon* and in *Hibiscus rosasinensis*, *H. esculentus* and *H. cannabinus* (Deccan hemp), and, after cotton was off the ground, was found in *Ficus religiosa*. Attempts are being made to find a resistant strain of cotton. A parasitic grub has been found in the larva, and both larvae and adults are attacked by a fungus. The continual pulling up of cotton plants seems to have no appreciable effect on the numbers of this pest. Generally only seedlings and young plants are attacked.

Another beetle, *Hispa armigera*, is a serious pest of all three crops of paddy in South Kanara. Crude oil emulsion acted as a deterrent and was successful where seed beds were taken in time. Bagging and clipping were equally efficacious. Great success was obtained in one field where it was possible to flood by running in water with crude oil emulsion floating on it. This might be a useful method to use with the first crop, but the insect needs further study before the best remedy can be determined. The damage done by *Platyedra gossypiella*, Saund., has been much reduced by the enforcement of the

Pest Act. There appears to be a long feeding stage between January and the end of March; after that time the generations overlap and follow each other rapidly. The author has not found the pink bollworm breeding in *Thespesia*, as it is supposed to do, but it breeds freely in bhindi [*Hibiscus esculentus*]. Native cottons, which have been alleged to be immune, do not appear to be so.

A list of Orthoptera observed in various districts is given.

RAMAKRISHNA AYYAR (T. V.). **Short Notes on New and Known Insects from South India.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 29–40, 5 plates.

This paper is supplementary to a previous one [*R. A.E.*, A, ix, 68] and deals with some 55 further species. Some new species are recorded, and brief notes are given on synonymy, distribution, life-history, habits, etc. Among the new species are an apparently new Braconid of the genus *Microplitis*; a wood-wasp (Siricid), which is apparently the first recorded from South India, this family being very rare in the tropics; a lablab vine gall-weevil; a gall-producing Psyllid on *Cinnamomum camphora*, to which it causes appreciable damage; and an apparently new grasshopper, *Phyllochoreia* sp., found in all stages on *Xylia* and *Terminalia* bushes, nibbling the tender foliage. Many new records of Coccids are added.

RAMACHANDRA RAO (Y.). *Oxya velox*.—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 41–42.

Oxya velox, a small grasshopper attacking paddy, has adapted itself to marsh conditions and feeds on grasses growing in wet situations. Both young and adults attack the leaves of paddy, especially in nurseries, and the adults bite at the bases of maturing earheads and cause them to dry up. Cotton and pulse crops are also attacked. On paddy, eggs are laid in masses of 10 to 29 among the stems and grass clumps an inch or two above water-level, and are protected by a red-brown gummy substance. Egg-masses are also found in the folds of cotton or paddy leaves. The incubation period varies from 15 to 41 days, depending chiefly on the season and the presence or absence of moisture, and being shortest in April, and longest in December and January. *O. velox* is most numerous from August to November, though it breeds throughout the year. The largest number of eggs laid by one female was 177.

Predators attacking this grasshopper are frogs and birds; parasites include a Sarcophagid, mites, and, among egg-parasites, the Chalcids, *Tumidiscapus oophagus*, Gir. (which is itself parasitised by *Aximopsis tumidiscapi*, Gir.), and *Anastatus coimbatorensis*, Gir., and the Proctotrupid, *Scelio oxyae*, Gir.

Ploughing is useless in the egg-stage, and collection of the egg-masses results in the destruction of the parasites as well; bagging is advocated when the grasshoppers are numerous.

DE MELLO (F.) & AFONSO (P. C.). **First Entomological Records in Portuguese India.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 43–48.

Little is known of the insects of economic importance in Portuguese India, as investigations were begun only six years ago. A list is given of the agricultural pests observed during the last two years.

RAMAKRISHNA AYYAR (T. V.). **An Entomologists' Crop Pest Calendar for the Madras Presidency.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 49–55, 1 plate.

The author has prepared a crop pest calendar, which, apart from abnormal and exceptional infestations, may be taken as a rough forecast of probable insect occurrence in the Madras Presidency. A diagram is shown, representing the periodical occurrence of some important paddy insects, with notes to supplement it.

The pests in question are *Spodoptera mauritia* (swarming caterpillar), *Schoenobius incertellus* (*bipunctifer*) (paddy stem-borer), *Hispa armigera, Leptispa pygmaea, Leptocorisa varicornis* (rice bug), *Nymphula depunctalis, Hieroglyphus banian, Pachydiplosis oryzae, Pseudococcus sacchari* (mealy bug) and the thrips, *Bagnallia oryzae.*

The author is of opinion that if such calendars are prepared for the different Provinces they will provide a fund of information on the distribution, seasonal variation and food habits of important crop pests throughout the Indian Empire.

ANDREWS (E. A.). **Some Notes on Attempts to produce Immunity from Insect Attack on Tea.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 56–59.

The work recorded earlier [*R. A. E.*, A, ix, 77] has been carried further on the same lines. It had already been clearly demonstrated that an increase in the ratio of potash to phosphoric acid in the leaf produces increased resistance to attack by *Helopeltis*, and experiments had indicated that the addition of potash to the soil had effectually increased that ratio. The only substance that has produced increased resistance is potash ; attempts to increase liability to attack appear to have failed. The method of immersing the roots in a solution of ½ to 1 per cent. potash (which proved to be the most satisfactory strength) is described. Although for various reasons, which are explained, many of the experiments were failures, the successful ones confirm the work of 1919, and show that potash, when taken up by the roots, results in decreased liability to attack, which is not of the same degree under different conditions. The relations between the results arrived at and the environmental conditions have yet to be worked out.

BALLARD (E.). **Report of Campaign against** *Spodoptera mauritia*, **Boisd. (Noctuidae) in Malabar.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 60–69, 5 plates.

Spodoptera mauritia, Boisd., is one of the most serious pests of paddy (*Oryza sativa*) in Malabar ; it generally appears unexpectedly and causes heavy losses within a short time. A short account of the life-history of this moth is given [*R. A. E.*, A, ix, 10]. The larvae feed at night, except in districts that are permanently under water, when they feed by day or remain clinging to the paddy blades, and it is then that the insect can best be destroyed. In Malabar there is only one generation a year, the moths emerging in May, by which time most of the paddy has been sown. With the monsoon rains the pest disappears, the larvae being drowned and carried away, or driven to the tops of the paddy blades, where many of them are devoured

by birds. The greatest damage occurs, therefore, in years when the monsoon is late. The occurrence of early rains about sowing time also has considerable influence on the appearance of *S. mauritia*.

A thorough campaign was instituted at the beginning of the season of 1920. The remedial measures that were advocated have for the most part been noticed previously [*R.A.E.*, A, v, 500; ix, 10]. In some parts of Malabar it is customary to scatter rice when *S. mauritia* appears, in order to attract birds. The provision of perches for birds in the fields is also recommended.

Parasites of *S. mauritia* include the Tachinids, *Actia aegyptia*, Villen., *Pseudogonia cinerascens*, Rond., *Tachina fallax*, Meig., *Sturmia bimaculata*, Hart., and *Cyphocera varia*, F., and a Braconid, *Chelonus* sp. The birds that feed on *S. mauritia* include the common crow (*Corvus splendens*), jungle crow (*C. macrorhynchus*), cattle egret (*Bubulcus coromandus*), paddy bird (*Ardeola grayi*), white-breasted water hen (*Amaurovius phoenicocurus*) and the common mynah (*Acridotheres tristis*).

Ballard (E.). **Results of Investigation of Bionomics of** *Platyedra gossypiella*, **Saunders, in South India, together with some Notes on** *Earias insulana* **and** *E. fabia*.—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 70–83, 3 plates.

Platyedra gossypiella (pink bollworm) has been regarded as a serious pest of cotton in South India only during the last few years, and it received very little attention before that date. The life-history is described. Investigations in 1919–20 show that it is extremely doubtful whether the resting or long-cycle type of larva occurs in South India, possibly owing to the absence of any cold weather. Graphs showing the seasonal incidence in various localities indicate that during the hot months the larval life is longer than later in the year. Therefore, at the time of season-picking, the larvae have not reached their last instar, prior to pupation; after this the increase in numbers is steadily maintained, the generations succeeding one another rapidly.

The relative increase of *Earias fabia* and *E. insulana* during the season is shown in tabular form. In October and November 1919 these species did much damage to the top-shoots of young cotton plants, but as a result the plants branched and produced more bolls, so that the crop was a good one. Towards the end of the year *Earias* spp. increase in numbers until the first flowering season is over, after which the numbers fall again.

The enforcement of the Pest Act in Coimbatore has given most encouraging results; it remains to be seen whether the extension of the area under the Act will be attended by equal success. The essential factor in control of this pest in South India seems to lie in strict enforcement of the Act, in putting sheep and goats to graze off the bolls before the plants are pulled up, and in the selection of an early-maturing strain of cotton. The fact that the pink bollworm shows no sign of producing long-cycle larvae makes the above remedial measures easier and obviates the introduction of machines or other apparatus for fumigating or otherwise treating the seed after ginning. It is doubtful whether hot-air treatment could ever be enforced in South India.

Natural enemies of *P. gossypiella* are the larval parasites, *Microbracon lefroyi* and *Apanteles* sp., but their effect is not great. A nymph, apparently of a Reduviid bug, was observed in one instance sucking the eggs, but it was not reared to maturity.

MISRA (C. S.). *Oxycarenus laetus*; **the Dusky Cotton Bug.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 84–92.

Oxycarenus laetus is quite a serious pest of cotton in India, the losses being frequently more than 20 per cent. of the value of the crop, besides the indirect damage due to the impaired vitality of the plant. Another cotton stainer, *Dysdercus cingulatus*, is a somewhat similar pest; both injure the lint as well as the seed, and feed for preference on open bolls, particularly those already damaged by *Earias fabia* and *E. insulana*. The effect of infestation by *O. laetus* is the shedding of enormous numbers of flowers and buds. The eggs are laid in clusters of about two to ten, generally in the lint of half-opened bolls, between the calyx and the boll, but when oviposition is at its height eggs may also be laid at random on the bolls, flowers, and buds. The life-cycle during the winter lasts from 36 to 50 days. The various stages are described. This pest has been reported from many widely separated localities, and perhaps occurs in all the cotton-growing tracts in India. Besides cotton, the known food-plants are *Hibiscus esculentus*, *H. cannabinus*, *H. abelmoscus*, hollyhock, *Abutilon indicum* and *Thespesia* sp.

No parasite of any stage was observed by the author. A small Anthocorid bug, *Triphleps tantillus*, has been seen to attack the nymphs on cotton at Pusa.

JHAVERI (T. N.). **Notes on Cotton Boll-worms** (*Earias fabia* **and** *E. insulana*).—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 93–95.

In Gujarat, the pink bollworm [*Platyedra gossypiella*] does no perceptible damage to the crop; the chief pests of cotton are *Earias fabia* and *E. insulana*, especially the former, which attacks the crop in all stages and particularly damages the young tender shoots in the seedling stage. Sometimes more than 50 per cent. of the young cotton plants are bored into and damaged, and later on young buds, flowers and small bolls are infested and there is much shedding of buds and flowers. Trap-crops of *Hibiscus esculentus* have proved very successful in keeping the pest from cotton, and an appreciable sum was realised by the sale of the pods. The removal of affected shoots by pruning was also tried, and the cost of various methods of pruning is discussed. The effect of weather conditions on the numbers of the larvae, and the relative proportion of young flower-buds shed as a result of bollworm attack and climatic conditions are also considered.

JHAVERI (T. N.). **Notes on Cotton Woolly Mite** (*Eriophyes gossypii*).—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 96–97.

The mite, *Eriophyes gossypii*, is particularly prevalent on a variety of cotton (*Gossypium herbaceum*) in the Gujarat district, the affected leaves having an ash-like appearance and remaining small and curled up. The mites live mostly under the epidermis of the leaf and cause

a growth of dense whitish hairs, on both leaf surfaces and on the stems. When the crop is more advanced, predacious Coccinellid larvae are noticeable in the colonies of mites. A very dry year seems to have the effect of increasing the numbers of mites, while moisture in the soil is thought to play an important part in reducing them. Dusting and spraying the crop with lime and sulphur seem to have little effect. A trial was made of steeping good quality seeds for ten minutes in a solution of one part mercury perchloride in 100 parts of water. The seeds were then dried in the shade and tests made for germination, after which they were sown. The germination and development of the plants were excellent. After about two months, the mites began to appear, but the infestation was only about 0·4 to 0·5 per cent., compared with 3 per cent. or more in the untreated plots. The removal of the first leaves that showed infestation was also helpful in checking the progress of the pest.

GHOSH (C. C.). **Supplementary Observations on Borers in Sugar-cane, Rice, etc.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 105–136, 10 plates.

This paper is supplementary to a previous one [*R. A.E.*, A, ix, 69]. A great deal of fresh information concerning borers and other pests is added; a few more internal borers are dealt with, and fresh alternative food-plants for several others have been discovered. A new key for differentiating the pupae is given, which supersedes that of the previous paper. A key is given for distinguishing the borer larvae, and the life-histories of 26 borers are dealt with.

The damage by borers to rice in the Pusa neighbourhood does not ordinarily exceed about 4 per cent. Further work on rice stem borers is necessary in all the rice-growing Provinces. In the districts of Bengal that have been examined, *Schoenobius incertellus* (*bipunctifer*) and *Chilo simplex* were the chief; in Burma the latter does not apparently occur, and the former seems to be the most important borer.

Recent experimental work with sugar-cane proves that the incidence of attack by insects is correlated with climatic conditions. It is especially during periods of drought that great damage is done by insects, particularly in Pusa and many parts of Upper India, where the crop is not irrigated, and where, owing to want of growth and tillering of the plants, the loss due to pests is not compensated for. At Pusa the chief injury to sugar-cane is caused in the early stages of its growth in April, May and June, when the conditions generally are high temperature and low humidity, with very little rainfall. The relation between damage and climatic conditions holds good in all varieties of cane, though thin ones show greater immunity than thick ones and also greater resistance to drought. Particular varieties are, therefore, suited to certain areas according to local climatic conditions. As a rule, thick varieties are not suitable in Upper and Western India. Certain varieties also show greater resistance to pest attack, but no kind has yet been found to be wholly resistant. The presence or absence of alternative food-plants in the locality exercises a great influence on the occurrence of at least some of the borers in sugar-cane.

The problem of borer control is not so acute in Southern India, where climatic conditions are favourable, as in the North, at Pusa for example, where thick canes yield about 50 per cent. less than they are capable of doing. Only one of every four shoots growing from

such canes is ever harvested, the other three being killed. The problem in these areas, therefore, is to evolve a variety of sugar-cane that can be planted at the time of the breaking of the monsoon, or even after it, without ripening later than the canes at present grown. This can probably be done by selection of the tillers that grow late, but ripen at the same time as the parent canes.

KHARE (J. L.). **Note on Sugar-cane Borers in the Central Provinces.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 137–142.

Sugar-cane is grown far less extensively in the Central Provinces than it was fifty years ago, the reasons for this decrease being largely economic. Many improvements have, however, been effected in the crop, among the chief being the introduction of foreign varieties. The best of these are mostly thick and high yielding, and therefore more susceptible to insect attack than the harder and low-yielding thin canes. Experiments to determine the relation of these introduced varieties to stem-borer attacks have shown that early planting gives greater immunity. A table shows the relative immunity of different varieties to stem-borers. The time of planting is an important factor in determining the extent of attack by stem-borers, the indications being that cane planted in October gives a much larger yield than that planted in February and March, as it gets a good start before the hot weather and before the moths become active. Borer damage all occurs between February and June, but is not found in cane that is already four to five feet high in February. The yield produced by planting both thick and thin canes at different dates is shown in a table, and proves that much damage is done to thick canes during the hot weather.

A survey was held in 1919–20 to ascertain the species of sugar-cane pests involved, their distribution in the sugar-cane areas, and their preferences for particular varieties of cane. The results gathered from 40 localities are tabulated. The species found were *Diatraea auricilia, Emmalocera* (*Papua*) *depressella, Scirpophaga xanthogastrella* (*auriflua*), *Sesamia uniformis* and *S. inferens*. *Chilo simplex* was not found at all. These moths attacked any variety of cane.

JHAVERI (T. N.). **Juar Stem-borers** (*Chilo simplex* **and** *Sesamia inferens*).—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 143–147.

The stem-borers, *Chilo simplex* and *Sesamia inferens*, are the cause of much deterioration of the monsoon crop of *Sorghum* in the Surat district. The former infests chiefly the seedling stage, so that the crops sometimes have to be resown once or twice. During July and August, and perhaps early September, the attack is severe; later in September Tachinid parasites begin to outnumber the pest, and by November very few remain in the stalk. Meantime *S. inferens* begins to gain ground; it appears in September, increases rapidly in October and November, and rests in the larval stage during December and January, according to the severity of the winter. In the summer, it breeds in sprouted shoots coming out from the sides of *Sorghum* stumps remaining in the ground.

As a measure against *C. simplex*, affected plants were removed at the first and second thinnings of the crop. Where too many gaps

occurred, the shoots with dead-hearts were cut back to ground and the side shoots allowed to grow up. If caterpillars were still found in the portion of the stump remaining in the ground they were picked out and killed. Plants so treated gave a very good yield. An attempt was made to rear the Tachinid parasites on a large scale in the insectary; oviposition, however, did not occur in the rearing cages, but further trials are in progress. Unfortunately, these flies cannot be satisfactorily reared in winter under artificial conditions.

S. inferens does not kill the plant outright, but it decreases the yield of grain in the ear-heads. After the crop is harvested, the insects enter the offshoots given out from stumps remaining in the ground, where they breed even in summer. During severe winter weather the caterpillars hibernate in the stalks. After the harvest, therefore, the stalks remaining in the ground should be dug out and burnt, or split up and used for chaff. A Braconid parasite infests these caterpillars, but it is not very efficient. The best remedy is the immediate removal of the stumps remaining in the ground after harvest, and burning them to prevent further breeding. Many borers were found in the harvested stalks of *Sorghum*; those that are being dried and stored as fodder for cattle and that contain hibernating larvae should, therefore, be made into chaff by power or hand-machine, which will destroy the majority of the insects.

Mr. T. Bainbrigge Fletcher, in discussing this paper, remarked that the subject of sugar-cane borers is a very important one; that the names of many of them are still very uncertain, and that the determination of the adults requires further study.

HUSAIN (M. A.) & PRUTHI (H. S.). **Preliminary Note on Winter Spraying against Mango Hopper** (*Idiocerus* **spp.), vernacular name, Tela.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 148–152.

The most serious pests of mangos in the Punjab are *Idiocerus* spp. (mango hoppers), of which *I. atkinsoni* is the species most commonly found. Hoppers that have survived the winter come out from under the bark in the spring and cluster on the floral buds, where they extract the sap from the growing inflorescence. Oviposition begins when the blossom heads appear, about the second or third week in February. Nymphs are first seen in March, and become adult in about 18 to 20 days. There is apparently only one generation a year, eleven months being spent as an adult, in which stage hibernation occurs. As a result of the feeding of the nymphs, the flowers shrivel, turn brown, and ultimately fall off. Old gardens, where the trees are closely grown, and particularly in regions having a hot and slightly moist climate, are especially affected. When mature, the hoppers leave the blossoms for the stems, where they collect in large numbers on the lower surfaces of the lower branches of the trees in the daytime, and underneath the leaves in the morning and evening. During the winter they are very inert and shelter in the crevices of the stems or among leaves webbed by spiders.

As the breeding season coincides with the flowering of the trees, spraying in the nymphal stage is likely to kill the flowers. The opened mango flowers are too delicate to stand a forcible spray, even of warm water. Winter sprays were, therefore, tried, and were used between 6 and 9.30 a.m., when the hoppers were least active. It was found that resin, with a strong contact poison, such as solignum or crude oil

emulsion, was the most effective substance. Successful formulae consisted of about 4 lb. resin, 2 lb. soda and 4 lb. solignum, with or without the addition of 1 lb. crude oil, in 25 gals. of water. An average of 10 gals. per tree was required. Only one spraying could be given for the test, the water supply was difficult, the trees were tall, and the apparatus insufficient to reach them properly. Even under these conditions, from 56 to 92 per cent. of the hoppers were killed. It is thought that two sprayings should be given in order to exterminate the pest, the first early in December and the second in mid-January. A third might be given in the second week of February, if necessary.

BALLARD (E.) & RAMACHANDRA RAO (Y.). **Notes on** *Natada nararia*, **Moore.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 153–156, 1 plate.

The information given in this paper has already been noticed [*R.A.E.*, A, ix, 580].

DUTT (H. L.). **Note on a Braconid Parasite of** *Agrotis ypsilon*.—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 157–163, 2 plates.

Further work is recorded on the Braconid parasite of *Agrotis ypsilon* on the lines previously suggested [*R. A.E.*, A, ix, 76]. This parasite oviposits exclusively on *A. ypsilon*, the eggs being laid on any part of the host caterpillar, but generally on the dorsal side of the first abdominal segments, while the larva is young Under artificial conditions, as many as 400–500 eggs have been laid on one host, though in nature the average number of parasitic larvae found in one caterpillar varies from 20 to 60. One female undoubtedly oviposits on more than one caterpillar. The egg and larval stages of the parasite vary from 28 to 34 days in January to about 25 in February, and the period is reduced in warmer weather to about 17 in March and about 12 in April. The pupal stage varies from 9 to 12 days in November to about 17 in December, 11 in January and February, and 8 in March. As the temperature rises towards April, the larvae aestivate within the body of the host, emerging as adults in the autumn. In the hills, this emergence begins with the break of the south-west monsoon in June. The adults die after three or four days, whether oviposition has occurred or not.

Adults first appear in the field with the first generation of *A. ypsilon*, in September or October, when the flood water is about to drain away, but the percentage of parasitism by this generation is very low; in November and December the number of parasites increases enormously, and 50 to 70 per cent. of the later generation of the moth are parasitised; this, however, is too late to save the crop. The activity of the parasites is at its maximum in February and March. Many of the aestivating pupae in the cocoons die during the extremely hot, dry winds in April and May, or during the subsequent submergence under flood water for about two months in the rains, only a few surviving in such sheltered positions as deep cracks in the soil. The temperature and moisture conditions in such situations are discussed.

With a view to utilising this parasite as a control for *A. ypsilon*, a study has been made of the factors that influence aestivation and emergence, with the object of having at hand a sufficient number of adult parasites, in September or October, for liberation when the

first larvae of *A. ypsilon* are noticed. The parasites cannot be reared through the heat of summer under ordinary conditions. From observations of parasitic cocoons it has been found that at about 80° F (which is the mean maximum temperature for two weeks preceding emergence from the cocoon) the functional activity of the parasite pupa is greatest, and the length of the pupal stage under such conditions is five days. If the temperature rises, the larva within becomes dormant, and if it falls lower, the pupal period gradually lengthens, until at 53° F. it is as long as 58 days. This relation between temperature and length of the pupal stage is shown in a graph. It has not been possible to determine the lower temperature limit for the functional activity of the parasite. Above 85° F., emergence of parasites from the cocoons stops, but the functional activity of the pupae may be revived, even after two months, by reducing the temperature below 80° F. So far as temperature is concerned, therefore, it is possible, by regulating this, to obtain emergence of adults at any desired time. The parasite pupae can be forced to become dormant by exposing them to a temperature much below 53° F., but as it is not economical to maintain it for several months, it has been found necessary to handle the problem by modifying the humidity, which is more easy to control than temperature. An experiment on these lines is in progress. At a constant relative humidity of 5° a cocoon becomes dormant and is still alive after two months in this condition ; whether successful emergence in the adult stage can be obtained under favourable conditions of humidity remains to be seen. If this can be accomplished, it will be possible to use a very much cheaper and more effective remedy for *A. ypsilon* than in the past.

RAMACHANDRA RAO (Y.). **A Preliminary List of the Insect Pests of Mesopotamia.**—*Rept Proc 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 164–173.

A number of insect pests noticed during a year's observations are recorded ; these cannot be taken as by any means an exhaustive list, and it has been impossible to identify many of them. They are listed under the crops attacked.

The most prominent element of agriculture in Mesopotamia is the cultivation of the date palm, and the most serious pest of the date crop is the moth producing the " hashaf " condition in the fruit [*R. A.E.*, A, vii, 189], which has now been identified as the Cosmopterygid, *Batrachedra amydraula*, Meyr. Other date pests, besides those previously listed [*R. A.E.*, A, ix, 91] include a Longicorn, which oviposits under the leaf bases or in cracks in the stem, into which the larvae bore, rendering the tree liable to break during high winds ; this has been wrongly identified as a species of *Rhynchophorus*, which does not occur in Iraq. A Fulgorid, which has two generations in a year, feeds in large numbers on the fronds, and a Coccid, *Phoenicococcus marlatti*, is found between the leaf bases and the trunk.

On wheat and barley, a fly, suspected of being the Hessian fly [*Mayetiola destructor*], is recorded. Mr. T. Bainbrigge Fletcher, in discussing this paper, remarked that it is very important to know whether this identification is correct.

In view of the possibilities of cultivation of cotton and other crops in Mesopotamia, it is of great importance that every effort should be made to prevent the introduction of such pests as the pink bollworm [*Platyedra gossypiella*], certain *Citrus* pests, and the Mediterranean fruit-fly [*Ceratitis capitata*].

SAMPSON (W.). **Hitherto undescribed Platypodidae and Scolytidae from Portuguese East Africa.**—*Ann. & Mag. Nat. Hist., London*, ix, no. 49, January 1922, pp. 137–142, 1 fig.

The new species described are: *Crossotarsus hardenbergi, C. opifex, Platypus penetralis* and *Cryphalus dexter.*

SANDERS (G. E.). **Our Arsenic Supply.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 8–11. [Received 23rd January 1922.]

It is stated that America produces between 7,000 and 8,000 tons of white arsenic and uses 16,000 tons annually, between one-half and one-third of which is used for purposes other than insecticides. It is probable that the demand for arsenic in insecticides will rise to over 10,000 tons.

If the use of a remedy is as expensive as the loss caused by the disease or insect concerned, it is useless to recommend it, and therefore in order to obtain the proper benefits and to lower the cost the following methods are recommended. Arsenicals that are combined with low-priced bases should be used, or white arsenic or mixtures of it used in place of arsenicals combined with expensive bases. Cheaper methods of applying arsenicals should be adopted, and reactions that render the cheaper arsenicals safe should be utilised. It should be proved to owners of arsenical ores that the use of arsenic is steadily increasing, and while the price may fluctuate it is not probable that it will drop so low as to render it unprofitable to operate high grade mispickle ores for arsenic alone.

BRITTAIN (W. H.). **The Biology and Stages of** *Gypona octolineata*, **Say.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 12–22, 1 plate. [Received 23rd January 1922.]

Previous literature on the synonymy, distribution, food-plants and the egg of *Gypona octolineata*, Say, is reviewed. A description is given of all stages of this leaf-hopper.

In Nova Scotia the egg-pouches have been observed in apple twigs, chiefly in the suckers at the base of the tree shaded by long grass, and in nursery stock. Experimentally the eggs hatched in two days. The entire duration of the nymphal stage was 79 days. The greatest activity of the larvae is in the first three instars. They are very inconspicuous when at rest on the twig. No detailed account of the actual nature of the injuries caused by the insect appears to have been compiled. If present in considerable numbers, it may become a pest of some importance, as a single specimen on an apple shoot soon produces a noticeable curling of the leaves. There is only one generation a year, the insect hibernating in the egg-stage in the twigs. The earliest date on which adults were taken was in August, and they have not been found later than early October.

DURLING (V. B.). **Points of Interest noted from 1920 Experiments.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 32–35. [Received 23rd January 1922.]

The following facts have been obtained from the investigations of 1920 for the dusting of apples and potatoes. Copper arsenic dust containing 4 per cent. metallic copper is as good as the ordinary liquid

sprays and better than sulphur dust. Alkaline diluents in sulphur dust definitely reduce the fungicidal value. Dolomite or magnesium lime proved safer with copper in copper arsenite dust and liquid Bordeaux and safer with all arsenates than did high calcium lime. High calcium is safer with arsenites. The new white arsenic formula for making poisoned Bordeaux proved very satisfactory. The formula is given and has already been noticed [*R. A.E.*, A, viii, 150 ; ix, 358]. Dusting gives the best results when the trees are damp and the air still.

DUSTAN (A. G.). **Entomogenous Fungi.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro,* no. 6, March 1921, pp. 36–45. [Received 23rd January 1922.]

Entomogenous fungi have played an important rôle in controlling insect pests, and in Florida they are now the chief factor in the control of whiteflies and scale-insects. Both larvae and pupae are liable to infection by these diseases, and in certain cases adults also.

The early work with fungi is reviewed, and the systematic position, life-history of typical species and the methods of spreading them are discussed. A fungous disease must lend itself readily to artificial spread if it is to be of use against insect outbreaks. The best known method of doing this is to suspend the spores in water and then to spray the insects or their food-plant. Care should be taken to apply the spray when the relative humidity is high. Some fungi can be spread by scattering infested insects amongst healthy ones. Another method is to pin or fasten leaves, or other parts of a tree on which diseased insects have fed, to a tree bearing a supply of the insects it is desired to inoculate. In Florida infected trees have sometimes been transplanted to act as distributing centres The inoculation of insects by way of the alimentary canal has not proved satisfactory in large field tests. Experiments are being undertaken to spread the spores of a fungus found living on the green apple bug [*Lygus communis* var. *novascotiensis*].

GORHAM (R. P.). **Some Notes on** *Apanteles hyphantria*, **Riley.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro,* no. 6, March 1921, pp. 46–50. [Received 23rd January 1922.]

Observations are recorded on the spinning of the cocoon by larvae of *Apanteles hyphantria*, Riley, bred from webs of *Hyphantria cunea*, Drury. The larvae were first found beginning to emerge from the host in August, and the adults emerged from the cocoons in seven days. The host larva may live at least twelve days after the emergence of the parasite. Nine days after the emergence of the parasite the larvae show signs of uneasiness when the parasite approaches. After emerging, females were observed darting at the living host larvae from which they had emerged as though about to deposit eggs on them.

TOTHILL (J. D.). **Results of the Spruce Budworm Survey in New Brunswick.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro,* no. 6, March 1921, pp. 51–53. [Received 23rd January 1922.]

The results of the survey to investigate the injury caused by spruce budworm [*Tortrix fumiferana*] in New Brunswick have not been fully compiled. The injured area was confined to the central part of New Brunswick, balsam fir being the chief tree attacked; 90 per cent. of the spruce attacked are now recovering.

BRITTAIN (W. H.). **Experiments in the Control of the Cabbage Maggot** (*Chortophila brassicae*, **Bouché) in 1920.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 54–73, 4 tables, 1 plate. [Received 23rd January 1922.]

Experiments in the control of *Phorbia* (*Chortophila*) *brassicae*, Bch. (cabbage maggot) were continued on the lines of the previous year, and the results are shown in tables [*R. A.E.*, A, ix, 127, 385]. Corrosive sublimate, creosote clay, anthracene oil-clay and tar-paper discs caused no deaths among the plants, and a tobacco corrosive sublimate and clay mixture only one. Corrosive sublimate gave the best yield. Experiments were undertaken to determine at what stages the insects were susceptible to corrosive sublimate and derris. Neither material was effective in the case of fully grown larvae. As larvae of the second generation were scarce, those of *Hylemyia antiqua*, Mg. (onion maggot) were used and were found to be killed by corrosive sublimate.

GILLIATT (F. C.). **The Brown-tail Moth Situation in Nova Scotia.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 74–80. [Received 23rd January 1922.]

The history of the increase of the brown-tail moth [*Nygmia phaeorrhoea*, Don.] in Nova Scotia is reviewed. Owing to inspection work, parasitic enemies, climatic conditions and spraying measures, this moth, which was steadily increasing up to 1913–14, is now well under control. The parasites include *Apanteles lacteicolor*, the larvae of which hibernate in the larvae of the host. It has been liberated in the Annapolis Valley and is now well established. The Carabid, *Calosoma sycophanta*, and the Tachinid, *Compsilura concinnata*, have also been liberated, but their establishment has not yet been proved.

The results of exposure experiments show that where the temperature does not drop lower than 10° below zero, it cannot be a controlling factor. For each degree of cold below −10 mortality increases, at −20, 65·85 per cent. of the larvae succumb, and at −25, 100 per cent. In well sprayed orchards there has never been a serious outbreak of this pest. Only early sprays are effective, and the last regular spray of the season kills all newly hatched larvae in the autumn.

DUSTAN (A. G.). **Some Notes on the Habits of** *Campoplex pilosulus*, **a Primary Parasite of the Fall Web-worm.**—*Proc. Ent. Soc. Nova Scotia, 1920, Truro*, no. 6, March 1921, pp. 81–88 [Received 23rd January 1922.]

The results of an investigation on the habits of *Campoplex pilosulus*, a primary parasite of *Hyphantria cunea*, Drury, are given, with a brief account of its life-history. Oviposition occurs in the larvae that are outside the protecting web. The parasitic larvae on hatching feed on the blood of their host, then pupate in the skin. After five or six days the adults emerge, and fertilisation takes place immediately, though no eggs are deposited in the autumn. The adults hibernate in old wood until the spring. It is possible that these oviposit in some early feeding larvae and that the adults of another generation parasitise the fall web-worm, or they may attack this host only.

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JARVIS (E.). **Entomology.**—*Queensland Agric. Jl., Brisbane,* xvi, pt. 6, December 1921, pp. 387–388.

From two districts, *Phragmatiphila truncata*, Wlk. (large cane moth-borer) is reported as being troublesome. The larvae attack young rattoons and plant canes, killing the central unfolding leaves, which wilt and turn brown. In large canes they are usually found boring the top of the stalk. This moth is effectively controlled by natural enemies, especially the ant, *Pheidole megacephala*. A Tachinid fly and the Braconid, *Apanteles nonagriae*, have been bred from parasitised larvae; the latter has not been previously recorded in Queensland.

DAVIS (J. J.) & LUGINBILL (P.). U.S. Bur. Ent. **The Green June Beetle or Fig Eater.**—*N. Carolina Agric. Expt. Sta., Raleigh,* Bull. 242, May 1921, 35 pp., 9 figs., 2 tables. [Received 23rd January 1922.]

Previous literature on *Allorrhina* (*Cotinis*) *nitida*, L. (green June beetle) is reviewed.

A description of all stages is given. It is generally distributed east of the Mississippi, and as far north as St. Louis and Cincinnati. The adults appear in July and August and deposit eggs in the soil, which hatch in two to three weeks. A single female may lay from 60–75 eggs. The larvae tunnel through the soil, feeding on humus, and at night throw up piles of earth like ant-hills. During cold periods they remain inactive, but have been known to become active on mild winter days. In spring active feeding begins, and by June pupation occurs. The total life-cycle occupies one year. The points of difference between the larvae and other related species are given. The adults frequently attack fruit, especially figs, grapes and peaches; and injury to other crops, including maize, has been reported. The larvae can cause considerable injury to field crops, as well as to lawns and meadows.

Natural enemies include *Scolia dubia*, Say, which winters in the larval stage, pupating in the spring. The adults emerge in August, when the host larvae are most abundant. *Sarcophaga sarraceniae*, Riley, *S. helicis*, Towns., and *S. utilis*, Aldr., have also been reported as parasites. Mites are often found on the adults, but there is no evidence that they are injurious to them. A fungus (*Metarrhizium anisopliae*) and *Micrococcus nigrofasciens* are reported to infest the larvae, the former only experimentally. A list of birds known to destroy the beetles is given. Moles and opossums have been stated to feed on the larvae.

The remedial measures recommended are spraying with 8–10 per cent. kerosene emulsion at the rate of 1 U.S. gal. to 6–8 sq. ft., and washed into the soil with copious sprinkling of water. The application should be made in the middle of August. On putting greens carbon bisulphide and hand-picking are recommended, as the emulsion may cause injury. Emulsifiable coal tar preparations are as cheap as and more easily prepared, but less effective, than kerosene emulsion. A material analysing approximately 12 per cent. phenols, 53 per cent. coal tar oils, 10 per cent. water and 25 per cent. saponifying agent, should be diluted 1 to 125 parts and applied as for kerosene emulsion One teaspoonful of carbon bisulphide per burrow gives satisfactory results. Hand-picking the larvae after rain or after artificially flooding infested ground is effective. The adults should be collected wherever practicable. As the beetles mainly deposit eggs in manure heaps, chemical fertilisers

should be used as much as possible in place of animal manures. Preventive measures should be practised for autumn planting of lucerne and oats in areas liable to infestation. Pigs and poultry should be allowed to run in infested fields. Ploughing is of little value, except in late May or June, and should be deep. Manure should not be applied to the ground until after the beetles have disappeared. In orchards hand-picking the adults is the only useful method. As larvae are often introduced into greenhouses in soil, it should be previously sterilised with steam.

HUTSON (J. C.). **Report of the Entomologist.**—*Rept. Ceylon Dept. Agric., 1920, Peradeniya,* 1921, pp. C. 15–17. [Received 23rd January 1922.]

Many of the pests on tea in Ceylon during 1920 have already been noticed [*R. A. E.*, A, ix, 318]; others include *Orgyia postica, Ricanoptera opaca, Pulastya acutipennis, Chionaspis theae, Toxoptera coffeae* (*Ceylonia theaecola*) and *Heterodera radicicola.* The pests of rubber were *Comocritis pieria, Batocera rubus, Saissetia hemisphaerica, S. nigra, Chionaspis dilatata, Hemichionaspis dracaenae, Sipalus hypocrita* and *Xylinades indignus.* Cacao pests include *Arbela quadrinotata, Helopeltis* sp., and *Toxoptera aurantiae,* which is generally controlled by Coccinellids and other natural enemies.

The following were reported on coconuts: *Nephantis serinopa, Rhynchophorus ferrugineus, Oryctes rhinoceros,* and larvae of *Herculia nigrivitta* and two new moths, *Erechthias pachygramma,* Meyr., and *E. lampadacma,* Meyr. Rice pests include: *Leptocorisa acuta, Schoenobius incertellus* (*bipunctifer*), and *Spodoptera mauritia.* In addition to the leaf-eating caterpillars of paddy mentioned in the last year's report [*R. A. E.*, A, viii, 519], the following are also reported: *Melanitis ismene, Ampittia maro, Leucania venalba, Lenodora vittata* and *Orsotrioena mandata*; and the leaf-hoppers, *Typhlocyba subrufa, Nephotettix bipunctatus* and *Tettigoniella spectra. Zeuzera coffeae* and *Coccus viridis* have been recorded on coffee.

Pests of leguminous plants include:—On *Erythrina lithosperma*: *Otinotus elongatus, O. oneratus* and *Agathodes ostentalis.* On *Cajanus indicus*: *Bruchus chinensis,* the Coreid, *Clavigralla scutellaris,* and caterpillars of *Pseudoterpna chlora.*

The damage caused by *Agrotis* spp. in vegetable gardens, and the remedial measures against them have already been noticed [*R. A. E.*, A, ix, 123]. The following pests on various food crops are recorded: *Plutella maculipennis* and *Crocidolomia binotalis* on cabbage; *Plutella sera* on turnip; *Dacus* (*Bactrocera*) *cucurbitae* in pumpkins, etc.; *Epilachna vigintioctopunctata* and *Urentius echinus* on leaves of egg-plant (*Solanum melongena*); *Helcystogramma hibisci,* folding leaves of *Hibiscus esculentus*; *Chilo* sp. and *Dactylispa soror,* a leaf-miner, in maize; a Fulgorid, *Orchesma signata,* on leaves of sugar-cane; *Odoiporus longicollis* in bulbs of plantain; *Aularches miliaris* on jak; *Apoderus tranquebaricus* on mango; and *Telchinia violae* on *Passiflora edulis.* The following were observed in stored products: *Bruchus chinensis* and *B. obtectus* in peas and beans; *Sitotroga cerealella, Corcyra cephalonica* and *Calandra oryzae* in rice; *Ephestia cautella* and *Corcyra cephalonica* in cacao beans; and *Lasioderma* sp. in leaf tobacco.

Miscellaneous pests include: *Attacus atlas*, *Argyroploce semiculta*, and *A. aprobola* on leaves of cinnamon; *Hypsipyla robusta* in shoots of toon (*Cedrela toona*) and mahogany; and *Acrocercops bisinuata*, a leaf-miner of *Eugenia malaccensis*.

JEPSON (F. P.). **Report of the Assistant Entomologist.**—*Rept. Ceylon Dept. Agric., 1920, Peradeniya*, 1921, pp. C. 17–18. [Received 23rd January 1922.]

The bulk of the information contained in this report has already been noticed from another source [*R.A.E.*, A, viii, 122].

GOWDEY (C. C.). **Annual Report of the Government Entomologist.**—*Ann. Rept. Jamaica Dept. Agric., 1920, Kingston*, 1921, pp. 25–27. [Received 24th January 1922.]

Among the pests recorded during the year, those attacking sugar-cane are: *Diatraea saccharalis*, F., which should be controlled by the systematic collection of eggs and the destruction of canes that are worthless for milling; larvae of *Lachnosterna* spp., on which the Elaterid, *Pyrophorus plagiophthalmus*, Germ., is predacious; *Stenocranus saccharivorus*, Westw.; *Xyleborus perforans*, Woll. (shot-hole borer); and *Eutermes ripperti*, Ramb.

Maize was attacked by *Laphygma frugiperda*, S & A. (fall army worm), against which spraying with lead arsenate and poison baits were used. Light shallow cultivation during the pupal period also proved effective. The natural enemies of this moth are the Carabid, *Calosoma laterale*, F., the Tachinids, *Frontina aletiae*, Riley, and *Archytas piliventris*, Wulp, the Ichneumonid, *Heniscospilus purgatus*, Say, and the Chalcids, *Chalcis robusta*, Cress., *Chalcis* sp., and *Spilochalcis femorata*, F. There appear to be four broods of *Heliothis obsoleta*, F., locally, the eggs of the first brood being laid on any available food-plant, such as maize, peas or beans. Other pests of maize are *Peregrinus maidis*, Ashm., *Gryllus assimilis*, F., the Chrysomelid, *Ceratoma ruficornis*, Oliv., and *Aphis maidis*, Fitch, the latter being attacked by the Coccinellid, *Neda sanguinea*, L.

Pseudischnaspis bowreyi, Ckll., occurring on sisal as well as on *Agave morrisi*, is attacked by the Tenebrionid, *Epitragus jamaicensis*, Champ., and *Neda* sp. *Scyphophorus acupunctatus*, Gyll., was found in polled sisal, this being apparently the first record of this weevil from Jamaica.

The pests of cacao were *Heliothrips* (*Selenothrips*) *rubrocinctus*, Giard, *Asterolecanium pustulans*, Ckll., and *Apate terebrans*, Pall.

Coffee is attacked by the scale-insects, *Saissetia hemisphaerica*, Targ., *S. nigra*, Nietn., and *Ischnaspis longirostris*, Sign., and also by *Leucoptera* (*Cemiostoma*) *coffeella*, Staint. (white leaf-miner). This moth is recorded for the first time from Jamaica. The eggs are laid in slits in the leaf and hatch in from four to six days. The larvae feed on the mesophyll for about three weeks and pupate in a web on the underside of the leaf. The pupal stage lasts from four to six days. The moths only live one or two days.

Cosmopolites sordidus, Germ., is not generally a serious pest of bananas, except in neglected plantations or in the absence of natural enemies.

The citrus black fly, *Aleurocanthus woglumi*, Ashby, has spread somewhat in spite of unfavourable weather conditions. Information

on the life-history of this pest and its relationship to the ant, *Cremastogaster brevispinosa*, Mayr, var. *minutior*, For., has already been noticed [*R.A.E.*, A, ix, 543]. Other pests of *Citrus* are the scales, *Chionaspis citri*, Comst., *Lepidosaphes beckii*, Newm., *Saissetia hemisphaerica*, Targ., *Chrysomphalus aonidum*, L., *Pseudaonidia articulatus*, Morg., and *Ischnaspis longirostris*, Sign., and also *Papilio cresphontes*, Cram.

The coconut pests are *Strategus titanus*, F. (rhinoceros beetle), *Vinsonia stellifera*, Westw., *Pseudoparlatoria ostreata*, Ckll., *Pinnaspis buxi*, Bch., *Diaspis boisduvali*, Sign., *Aleurodicus cocois*, Curt., and *Xyleborus* sp.

Other miscellaneous pests are *Metamasius ritchei*, Mshl., and *Pseudococcus brevipes*, Ckll., on pineapple; *Aphis illinoisensis*, Schiner, *Aspidiotus cydoniae*, Comst., *Apate terebrans*, Pall., and *Dinoderus* sp. on grape; *Heliothrips rubrocinctus*, Giard, on mango; *Anastrepha fraterculus*, Wied., on mango, plums, almond and guava; *Asterolecanium pustulans*, Ckll., on bread-fruit; *Cylindera flava*, F., and *Odonaspis pimentae*, Newst., on pimento, though the latter apparently does no damage; *Aspidiotus hartii*, Ckll., and *Palaeopus dioscoreae*, Pierce, on yam; *Cylas formicarius elegantulus*, Sum., *Ceratoma ruficornis*, Oliv., and *Coptocycla flavolineata*, Latr., on sweet potato; *Myzus* (*Rhopalosiphum*) *persicae*, Sulz., on cabbage; *Saissetia hemisphaerica*, Targ., *Aspidiotus cydoniae*, Comst., and *Hemichionaspis minor*, Mask., on egg-plants; *Lonchaea chalybea*, Wied. (bud-maggot), and larvae of *Erinnyis ello*, L. (preyed on by *Alcaeorhynchus grandis*, Dall.) on cassava; *Hemichionaspis minor*, Mask., *Saissetia hemisphaerica*, Targ., *S. oleae*, Bern., and *Macraspis tetradactyla* on Congo peas; and *Ephestia kühniella*, Z., in stored flour.

Piot (J. B.). **Démarche de "L'Union des Agriculteurs d'Egypte" à propos du Ver du Cotonnier.**—*Bull. Union Agric. Egypte, Cairo*, xix, no. 142, November-December 1921, pp. 129–132.

A meeting of the Ministry of Agriculture was held on 20th December to consider the adoption of a supplementary decree suggested by the Union of Agriculturists of Egypt in view of the continued depredations caused by the pink bollworm [*Platyedra gossypiella*]. The effect of the decree is to enforce the compulsory destruction of fallen capsules and the collection and burning of bolls still on the plants, as well as the fallen ones. It is also suggested that better results might be obtained if a small sum were paid for collected bolls as has been done for collected locust eggs. It was reported that in spite of the systematic collection of capsules and the application of other remedial measures that have been carried out in a certain district for the past four years there appears to be no evident reduction of the moth. It would, therefore, seem that some other method of control will have to be considered. It is possible that the growing of an early variety of cotton, at least for a few years, might have the effect of reducing the damage caused.

Smith (L.). **Sugar Cane in St. Croix.**—*Virgin Island Agric. Expt. Sta., St. Croix*, Bull. 2, 12th September 1921, 23 pp., 1 plate, 2 figs. [Received 24th January 1922.]

In this bulletin, dealing with the cultivation of sugar-cane, the following insects are recorded as attacking it in St. Croix: *Diatraea saccharalis* (moth borer); root grubs, such as those of *Ligyrus tumulosus* and *Strategus titanus*; the weevils, *Metamasius sericeus* and *Diaprepes*

farinosus; the Longicorn, *Lagochirus araneiformis*; *Xyleborus perforans* (shot-hole borer); and the Coccids, *Pseudococcus sacchari*, *P. calceolariae* and *Targionia sacchari*.

A brief account of the remedial measures advocated is given.

WADE (J. S.) & MYERS (P. R.). U.S. Bur. Ent. **Observations relative to recent Recoveries of** *Pleurotropis epigonus*, **Walker. (Hym.).**—*Proc. Ent. Soc., Washington, D.C.*, xxiii, no. 9, December 1921, pp. 202–206.

The occurrence of *Pleurotropis epigonus*, Wlk., a parasite of *Mayetiola* (*Phytophaga*) *destructor*, Say, in America since its introduction from England is reviewed [*cf.* *R.A.E*, A, iv, 195]. It has now become established and occurs throughout Maryland, Pennsylvania, New Jersey and New York. A list is given of all known records of distribution.

CRAIGHEAD (F. C) & LOUGHBOROUGH (W. K.). **Temperatures fatal to Larvae of the Red-headed Ash Borer as applicable to Commercial Kiln Drying.**—*Jl. Forestry*, xix, no. 3, 1921, pp. 250–254. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 7, November 1921, p. 662.)

The conclusion is arrived at that the larvae of the red-headed ash borer (*Neoclytus erythrocephalus*, F.) are killed in any kiln process which can be considered practical for the seasoning of ash, regardless of the thickness of the timber. Even temperatures as low as 105 to 135° F. are fatal to them. Subjecting infested material to a temperature of 116° for 45 hours resulted in the death of all the larvae. Temperatures of about 125 to 130° will kill the larvae within an hour after the wood becomes heated throughout. Dry heat is fatal to the larvae at a lower temperature than hot water for the same period.

In dry air experiments several larvae of *Xylotrechus colonus*, F., from hickory were used, and the effects were similar to those produced on *N. erythrocephalus*. Although it is hardly likely that the same temperatures will be equally fatal to other insects, such as those native to the Southern States, it is probably safe to assume that if commercial kiln schedules at temperatures higher than those given are used on other woods, other species of borers that may be in the timber will be killed.

CLUTE (W. N.). **Cure for Iris Borer.**—*Flower Grower*, viii, no. 2, 1921, p. 33. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 8, December 1921, p. 759.)

The iris borer, *Macronoctua onusta*, which is found in most species of *Iris* and closely related plants, lays its eggs in autumn on the old leaves. The caterpillar hatches out in the spring, bores down through the sheaf of leaves, and soon establishes itself in the root-stock, where it is almost impossible to reach it. The best remedy is said to consist in burning over the iris beds in early spring before it has gained access to the root-stock. Burning a thin cover of dead weeds raked over the plants, when the wind is right, is said to be sufficient to destroy the borer.

HOWARD (F. K.). **Nicotine Dust for Grape Leafhopper.**—*Calif. Cult.*, lvi, no. 21, 1921, pp. 671 & 678, 1 fig. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 8, December 1921, p. 757.)

Dusts containing as much as 10 per cent. Black-leaf 40 in various combinations were used against the adults of the grape leaf-hopper [*Typhlocyba comes*], but in all cases it was found that the insects were so active as to avoid satisfactory contact with these materials. Where the proper contact could be secured, dusts containing 5 per cent. or more of Black-leaf 40 were found to kill the insect.

It is concluded that a large percentage of the wingless nymphs can be cheaply and effectively killed in this manner, and it is recommended that the materials used should contain at least 5 per cent. of Black-leaf 40, and that from 60 to 75 per cent. of sublimed sulphur be added to combat mildew. The application should be made in such a manner that the dust is directed upward into the vines, since the young occur on the lower surfaces of the leaves. The young hoppers are said to have commenced hatching on the 1st May in the Fresno district of California. The application should be made when the majority of the insects have hatched, and when as few as possible have reached the winged stage. It is thought possible that in the worst infestations two dustings may be necessary to destroy all the individuals of the first brood.

ITIÉ (G.) **Las Plagas del Algodón en la Comarca Lagunera.** [Cotton Pests in the Laguna District.]—*Rev. Agric., Mexico*, vi, no. 9, January 1922, pp. 504–513, 13 figs.

The information in this paper concerning *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm), which is the worst pest of cotton in the Laguna District of Mexico, has previously been noticed [*R. A.E.*, A., ix, 461, 587]. Of less importance is *Anthonomus grandis* (cotton bollworm), which, under normal conditions, can never be a very severe pest in the district. It is endemic in the region and increases in numbers towards the end of autumn. Serious damage is caused by *Aphis gossypii*, which collects in numbers on the lower surface of the leaves and at the tips of the branches, causing yellowing and defoliation. Nicotine has proved the best remedy for this Aphid. *Tetranychus bimaculatus* webs the lower surfaces of the leaves and causes defoliation by its punctures, and sometimes the death of the plant. This mite increases rapidly, and when infestation is severe it is best to destroy the focus of infestation and spray the surrounding area with calcium bisulphide. The bug, *Pentatoma ligata*, is not widely distributed. It causes withering of the bolls and a consequent reduction in the crop. The caterpillars of *Alabama argillacea* and *Heliothis obsoleta* (*armigera*), do considerable damage, especially in rainy seasons; their control by means of arsenical dusts is comparatively easy.

CATONI (L. A.). **Dos Plagas del Algodón que no queremos en Puerto Rico.** [Two Cotton Pests that are not wanted in Porto Rico.]—*P.R. Insular Expt. Sta., Rio Piedras*, Circ. 41, April 1921, 9 pp. [Received 27th January 1922.]

The Porto Rico Department of Agriculture requests all cotton-growers to co-operate in guarding against importing into the Island any cotton seed proceeding from countries where *Anthonomus grandis* (cotton bollworm) or *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) occur [see, however, *R. A.E.*, A, ix, 560].

(5980) Wt. / 1,500 4/22 Harrow G. 75 M

VAYSSIÈRE (P.). **L'Invasion du Criquet Marocain en Crau en 1920.**—Separate from *C.R. Acad. Agric. France*, 2nd June 1920, 6 pp. [Received 24th January 1922.]

This information with regard to the measures undertaken for the destruction of *Dociostaurus maroccanus* has been noticed elsewhere [*R.A.E.*, A, ix, 403].

VAYSSIÈRE (P.). **Observations Biologiques sur** *Dociostaurus maroccanus*, **en Crau.**—*Bull. Soc. Zool. France*, xliv, 11th November 1919, pp. 359–363. [Received 24th January 1922.]

A brief account is given of the observations made during 1919 on the oviposition, flight and other habits of *Dociostaurus maroccanus* [*cf. R.A.E.*, A, vii, 432].

SMITH (—). **Lutte contre les Pucerons.**—*Rev. Hortic. Algérie, Algiers*, xxv, no. 3, April–May 1921, p. 60. [Received 24th January 1922.]

Aphids are killed in a few minutes by the application of a dust consisting of 100 parts of powdered lime to 30 parts of tobacco powder. This mixture is also very effective against young grasshoppers if applied within two hours after hatching. Either powder used alone proved ineffective, and no advantage was obtained by an increased amount of tobacco.

VERLOT (J. B.). **Emploi de l'Appareil Lance-Flammes pour la Destruction des Criquets.**—*Vie Agric. & Rur., Paris*, xx, no. 3, 21st January 1922, pp 50–52, 3 figs.

A flame-throwing apparatus recommended for use in the destruction of locusts is described and illustrated.

RIVIÈRE (G.). **Le Tigre du Poirier.**—*Jl. Soc. Nat. Hortic. France, Paris*, xxii, December 1921, pp. 402–403.

Stephanitis (*Tingis*) *pyri* is recorded as damaging pears in various localities of the Seine-et-Oise district. All varieties are attacked when grown as wall fruit with an eastern or southern aspect, the injury being usually confined to wall trees. Remedial measures in the form of insecticides should be applied very early in the morning. Tobacco juice, even in weak solutions, has given good results provided that the jet is directed upwards so as to reach the bugs on the lower surface of the leaves.

CATAN (M. P.). **El** *Diaspis pentagona* **en nuestros Arboles frutales.** [*Diaspis pentagona* on our Fruit Trees.]—*An. Soc. Rur. Argentina, Buenos Aires*, lv, no. 20, 15th October 1921, p. 759.

The increase of the mulberry scale, *Diaspis pentagona*, Targ., in Argentina in 1921 renders it necessary that both artificial measures and the natural control afforded by *Prospaltella berlesei* should be fully utilised. Both forms of control were successfully employed in the past, but were afterwards neglected. In some districts *P. berlesei* has eradicated the scale and has itself disappeared in consequence.

PRIESNER (H.). **Ein neuer** *Liothrips* **(Uzel) [Ord. Thysanoptera] aus den Niederlanden.** [A New *Liothrips* from Holland.]—*Zool. Meded. R. Mus. Nat. Hist.*, Leiden, v, no. 4, 31st December 1920, pp. 211–212. [Received 30th January 1922.]

Liothrips vaneecki, sp. n., is described from the bulb scales of *Lilium pardalinum*.

KOTILA (J. E.). **Hopperburn of Potato and its Control.**—*Qtrly. Bull. Michigan Agric. Expt. Sta., East Lansing*, iii, no. 4, May 1921, pp. 128–131, 3 figs. [Received 30th January 1922.]

The seasonal history of the potato leaf-hopper, *Empoasca mali*, as occurring in Michigan, and the method of controlling its ravages by means of Bordeaux mixture are briefly described [*cf. R.A.E.*, A, ix, 31]. At least four applications of the spray are advocated.

FOWLER (G. J.). **The Lac Industry.**—*Appendix 12th Ann. Rept. Council Ind. Inst. Sci., Bangalore*, 1921, pp. 8–12. [Received 30th January 1922.]

A study is being made of the conditions of life of the lac insect, with the object of determining what is its actual food, and what are the chemical transformations involved in converting such substances into lac. It is hoped by this means to find a scientific basis for the control of the activity of the insect, by discovering from their chemical composition which trees are suitable as food-plants and at what period of their growth they are likely to give the best results. A thorough knowledge of the metabolism of the lac insect may render it possible to feed it artificially and so produce lac by bio-chemical methods, but under controlled conditions. Lac is known to grow well on *Shorea talura*, and it has also been found growing at Bangalore on *Ficus benjaminiana*. There are apparently two, and possibly three, generations of the insect in a year.

Two new species of lac insect have been discovered during the year; one, found on *Michelia champaka* in Mysore, had also been observed on mango trees in the Philippines and described as *Tachardia minuta*, Morr.; the other, found on *Acacia sundara*, is allied to both *T. minuta* and *T. decorella*, Mask.

Two forms of bacteria have been discovered that are apparently characteristic of unhealthy lac, while a yeast-like organism seems to occur only on healthy growth; further investigations on these are in progress. Insect enemies of the lac insect are the larva of a lace-wing fly, *Chrysopa* sp., and the caterpillar of *Eublemma* sp. The chemical examination of lac-bearing twigs is briefly discussed.

HOWARD (L. O.). **Report [1920–21] of the Entomologist.**—*U.S. Dept. Agric., Washington, D.C.*, 1st August 1921, 33 pp. [Received 24th January 1922.]

During the year the apparent increase of the area infested by the European corn borer [*Pyrausta nubilalis*] may be said to have been comparatively insignificant in United States territory. The most important development was the discovery in August 1920 of a large infestation in Southern Ontario. The western edge of this Canadian infestation reaches within 30 miles of Michigan, and thus offers a great menace to the maize-belt States. Large quantities of the

natural enemies of the borer have been imported from Europe, and about 6,000 parasites of two or more species have been liberated in eastern New England.

Owing to the very serious outbreaks of grasshoppers in North Dakota and the surrounding States during the past three years, a sum of about £8,000 was appropriated for work against them. At the time of writing these outbreaks showed definite signs of abatement.

Great success attended the use of poisoned bran baits against crane-fly larvae [*Tipula simplex* and *T. qualei*] destroying the grass on cattle ranges in the interior valleys of California. It was found that from 70 to 90 per cent. of the larvae could be destroyed at a cost of about 2*s*. per acre [*R. A.E.*, A, ix, 575]. The general incidence of Hessian fly [*Mayetiola destructor*] did not increase in intensity, and in the winter-wheat belt co-operative work resulted in a material reduction of losses. Chinch bugs [*Blissus leucopterus*] continued to be serious in Missouri, Illinois, Indiana, and parts of Ohio. In addition to the successful method of spraying against the alfalfa weevil [*Hypera variabilis*] mentioned in the previous report [*R. A.E.*, A, ix, 111], the further introduction from South Europe of natural enemies of this pest was decided upon. One species, imported before the war, is doing effective work in some localities. For the first time in several years an outbreak of green bug [*Toxoptera graminum*] occurred in the spring, being favoured by the mild winter, during which it was abundant in Northern Texas. As the season advanced, it appeared in Oklahoma, Kansas and Missouri, and might have become disastrous but for the advent of dry, warm weather in March and April, which allowed parasites to increase and check the pest, so that, although the oat crop in Northern Texas was seriously injured, the damage to winter wheat was comparatively slight. Self-sown oats and wheat should be destroyed instead of encouraged as at present, because these provide continuous shelter and breeding places. As sunflowers are being adopted for silage in certain parts of the West, an investigation of the insects affecting them has been begun. The wheat midge [*Contarinia tritici*], after doing little harm for 50 years, has become progressively injurious during the past two years in Washington and Oregon. With the introduction of the hairy vetch as a forage and seed crop in the Carolinas the corn earworm [*Heliothis obsoleta*] has attacked it severely [*R. A.E.*, A, ix, 577].

The beneficial results of expert advice relating to insects attacking stored maize and other grain products has paid many times the cost of the research connected with the problem. The control of pea and bean weevils by cold storage and fumigation has been studied. Fumigation has been shown to give complete protection to peanuts in the shuck, so that stocks can be kept indefinitely. Fumigation also largely prevents the damage to baled skins by the hide beetle [*Dermestes*], amounting to an annual loss of about £200,000 Meat of the same value has been condemned as a result of insect infestation, and experimental control work has been begun.

The Japanese beetle [*Popillia japonica*] is now known to occupy 80 square miles in New Jersey and 10 in Pennsylvania. The barrier policy [*R. A.E.*, A, ix, 111] has been discontinued. It is hoped that some peculiarity in the habits of this beetle will be found that will enable its numbers to be reduced. Several shipments of predatory and parasitic insects have been made from Japan, and the native enemies of white grubs in other parts of the United States and certain

Hymenopterous parasites have been sent from the Middle West to New Jersey. The plum curculio [*Conotrachelus nenuphar*] having continued to do severe damage in peach orchards in Georgia, an intensive campaign was outlined in December 1920 and then applied with such success that an excellent crop was marketed with comparatively little damage. Work on the codling moth [*Cydia pomonella*] has been continued. Shipments of parasitised caterpillars have been sent from the East to the State of Washington. Against the peach borer [*Aegeria exitiosa*] the paradichlorobenzene treatment has continued to prove effective and safe and is in general commercial use. Nut insects were dealt with at some length in the previous report [*R.A.E.*, A, ix, 112]. Experiments with arsenical dusts and sprays show that the pecan case-bearer [*Acrobasis nebulella*] is kept under by them. The obscure scale [*Chrysomphalus obscurus*] on pecan can be checked by spraying with lime-sulphur or with oil emulsion during the dormant season. In the grape-growing industry a marked improvement has followed the general adoption of the sprays developed by the Bureau of Entomology. The two-spray schedule against the grape-berry moth [*Polychrosis viteana*] has yielded a high percentage of sound fruit. Sulphur fumigation against the grape mealy-bug [*Pseudococcus bakeri*] has been abandoned, and experiments are being made with miscible oils. The grape sphinx moth [*Pholus achemon*] occurred in alarming numbers in Merced County, California.

A comparative study of arsenicals as insecticides was concluded in the course of the year, many results of practical application being reached. In a study of the insecticidal constituents, 180 preparations from 46 kinds of plants were examined; only a few, however, were found worth further study. In an investigation of contact insecticides as substitutes for nicotine or tobacco extract, the most poisonous were found to be among the organic nitrogen compounds.

As a result of work against the sweet potato weevil [*Cylas formicarius*] in Florida and Georgia, two-thirds of the previously infested area can be declared weevil-free. The spread of the Mexican bean beetle [*Epilachna corrupta*] is evidently beyond the bounds of human control, so that future work must be based on research. Resistant or semi-resistant varieties of beans and natural enemies are being sought for.

Insects injurious to potato, tomato and related crops include the Colorado potato beetle [*Leptinotarsa decemlineata*], potato leaf-hopper [*Empoasca mali*] and tarnished plant bug [*Lygus pratensis*]. Calcium arsenate gave good results against the tomato fruit-worm [*Heliothis obsoleta*], and trap-crops of sweet maize were also useful.

Among the pests of cabbage and similar crops are a flea-beetle, previously unknown as a pest, in New York. A related species, the brassy cabbage flea-beetle, has been studied in Louisiana; it is likely to become a serious pest in the absence of its wild food-plants.

Against the striped cucumber beetle [*Diabrotica vittata*] in the district of Columbia nicotine sulphate in dust form has proved most promising. In the work against the sugar-beet hopper [*Eutettix tenella*] the studies with the 350 types of resistant beets mentioned in the previous report are giving promising results.

The gipsy moth [*Porthetria dispar*] was discovered in New York, and it was found that shipments from the infested centre had been made to a number of States. It is thought that all these have been traced. Operations have been carried out to eradicate or limit the

infestation. A further search for additional natural enemies in Europe and the reintroduction of some of the species that have not been recovered in New England might result in valuable assistance against this pest. The brown-tail moth [*Nygmia phaeorrhoea*] had been relatively scarce during the past five years, owing partly to its natural enemies, especially imported parasites, but its numbers increased during the summer of 1921.

Among southern crop pests the cotton boll-weevil [*Anthonomus grandis*] was treated by dusting with dry powdered calcium arsenate on a large scale, 75,000 acres of cotton being dealt with. A brief summary of rules for poisoning has been issued, and is widely used by the farmers. The tobacco hornworm [*Protoparce*] remained the most important tobacco pest in Kentucky and Tennessee, and a mule duster, especially adapted for treating two rows of tobacco at the same time, has been constructed and is being perfected. In the Georgia and Florida tobacco belts dusting and spraying served, in conjunction with weather conditions, to reduce to a minimum the damage done by the tobacco flea-beetle [*Epitrix parvula*] and tobacco thrips [*Frankliniella fusca*].

The collection was continued of Tachinid parasites of the sugar-cane moth borer [*Diatraea saccharalis*] in Cuba and their shipment to Louisiana; there is evidence that they will prove valuable in control. To avoid the destruction of the native egg-parasite, the leaves left on the cane field are not burned, but ploughed under; this also improves the soil.

A summary is given of the work in connection with pests of citrus fruit in California and Florida; pests of mango, avocado, and other subtropical fruits; greenhouse insects, including *Chrysomphalus biformis* on orchids, and the oleander black scale, *Saissetia oleae*; Mediterranean fruit-fly [*Ceratitis capitata*] and melon fly [*Dacus cucurbitae*]; and pests of forest and shade trees. Bee-culture investigations are reported on. There is a brief account of the insect pest survey instituted with the object of collecting scientific data on insect conditions throughout the Union and of issuing a bulletin on the insect conditions of the preceding month [*cf. R.A.E.*, A, x, 98].

MINANGOIN (N.). **La Lutte contre la Mouche de l'Orange** (*Ceratitis capitata*).—*Rev. Agric. Afr. Nord., Algiers*, xx, no. 130, 27th January 1922, pp. 62–64, 2 figs.

The poison bait mixture here recommended for *Ceratitis capitata* consists of a small amount of preserved figs boiled in water until reduced to pulp, and water containing sodium arsenite at the rate of about $\frac{1}{3}$ ounce to $1\frac{3}{4}$ pints. The flasks to be hung in the trees should be two-thirds full. For trees of about 15 to 20 years one is sufficient, but two should be hung in older trees. The attractiveness of the mixture may be increased by the addition of a little orange juice.

VAN WARMELO (H.). *Vigna oligosperma* **als Grondbedekker in de Thee.** [*V. oligosperma* as a Ground Cover Plant for Tea.]—*De Thee, Buitenzorg*, ii, no. 4, December 1921, pp. 103–107.

The title of this paper indicates its contents. In an additional note, Dr. C. Bernard states that in his district *Vigna oligosperma* remained untouched by *Helopeltis* infesting the tea amongst it. It was also uninjured by Chrysomelid beetles, though these have been known to attack this cover crop elsewhere.

MENZEL (R.). **Over Parasieten van schadelijke Insekten.** [On Parasites of Injurious Insects.]—*De Thee, Buitenzorg,* ii, no. 4, December 1921, pp. 108–112, 1 plate.

In a case of severe infestation of tea by the Limacodid, *Setora nitens*, it became evident that a Tachinid parasite was one of the factors responsible for the sudden termination of the outbreak. Most of the eggs of *S. nitens* are laid on the tea leaves, and are covered with a waxy substance. After about seven days the caterpillars hatch and at once begin feeding. After some moults they pupate, the pupal stage lasting 18–20 days. The entire life-cycle requires about 1½–2 months, so that several generations are possible in a year. As the Tachinid concerned appears to be valuable, collected host-cocoons should be kept so as to permit its emergence.

A bunch-caterpillar (*Andraca*) is also parasitised by a Tachinid, the larva of which abandons its host in order to pupate elsewhere, probably in the ground.

The author thinks that the Nematode parasite found in *Helopeltis* [*R.A.E.*, A, ix, 493] leaves its host in order to mature and oviposit in damp ground, from which the larvae return in wet weather to the tea plants. As they need damp ground before finding their insect host, it is probable that infested *Helopeltis* will be most abundant in the rainy season. This is confirmed by the fact that the highest percentage of infestation in *Helopeltis* occurs from February to April.

CORPORAAL (J. B.). **Schadelijke Insecten in de Thee op Sumatra's Oostkust 1920–1921.** [Pests of Tea on the East Coast of Sumatra in 1920–21.]—*De Thee, Buitenzorg,* ii, no. 4, December 1921, pp. 113–114.

The information given in this paper is substantially that contained in a section of an annual report already noticed [*R.A.E.*, A, ix, 604]. A Pentatomid bug, recorded in a former annual report as *Dalpada* sp. [*R.A.E.*, A, viii, 495], has been identified as *Cantheconidea robusta*, Dist. (*cognata*, Dist.). It may be beneficial, if indications as to its preying on caterpillars prove to be correct.

BERNARD (C.). **De "Bunch-Caterpillar" op Java en Sumatra.** [The Bunch-caterpillar in Java and Sumatra.]—*De Thee, Buitenzorg,* ii, no. 4, December 1921, pp. 115–116.

Mr. J. B. Corporaal has stated that the "bunch-caterpillar" of Sumatra is a Notodontid, *Bombisatur corporaali*, van Eecke, not to be confused with the "bunch-caterpillar" of British India, *Andraca bipunctata*, Wlk. [*R.A.E.*, A, ix, 604]. Since then, van Eecke has revised his opinion and considers the moth to belong to the genus *Andraca*. The matter is complicated by the fact that there occurs in Java a species entirely similar to the bunch-caterpillar of British India; the Sumatran species probably belongs to the genus *Andraca*, but is not *A. bipunctata*. [Specimens received from Dr. Roepke show that *Bombisatur corporaali* is merely a synonym of *Andraca apodecta*, Swinhoe.—ED.]

BERNARD (C.). **Over een nieuwe Plaag van de Thee, veroorzaakt door** *Phytorus dilatatus.* [On a New Injury to Tea due to *P. dilatatus.*] —*De Thee, Buitenzorg,* ii, no. 4, December 1921, pp. 116–119, 2 plates.

The Chrysomelid, *Phytorus dilatatus,* Jac., which has been recorded from tea in Sumatra in the past, but not as of economic importance, did sufficient damage to tea in 1921 to warrant close attention being paid to it. In one instance the infestation began on cabbage and spread to yams and then to tea, when the yam leaves had reached full growth. *P. dilatatus* has also been seen on a Composite and on *Mallotus philippinensis,* a wild plant. The young leaves of infested tea plants were eaten, and many plants had the broom-like appearance characteristic of red rust. The base of the young twigs was also eaten. *P. dilatatus* has not yet been found on tea in Java, but according to Corporaal it has been observed in Western Java on various plants near a tea estate.

GARRETSEN (A. J.). **Een toevallig Optreden van** *Delias belisama* **in Theetuinen.** [An Accidental Occurrence of *D. belisama* on Tea.] —*De Thee, Buitenzorg,* ii, no. 4, December 1921, pp. 119–120, 1 plate.

This is a record of an accidental infestation of tea by a Pierid butterfly, *Delias belisama,* Cram. It is not a normal pest of tea, and is, indeed, usually beneficial, as it lives on a parasitic mistletoe, *Loranthus* sp.

G[ARRETSEN] (A. J.). **Bestaat er Verband tusschen** *Helopeltis* **en Snoei?** [Is there a Connection between *Helopeltis* and Pruning?] —*De Thee, Buitenzorg,* ii, no. 4, December 1921, p. 121.

The attention of tea planters is drawn to the necessity for recording observations regarding pruning and the occurrence of *Helopeltis,* both as regards the different methods adopted and the date at which this work is done.

HILL (G. F.). **New and Rare Australian Termites, with Notes on their Biology.**—*Proc. Linn. Soc. N.S.W., Sydney,* xlvi, pt. 4, no. 184, 23rd December 1921, pp. 433–456, 1 plate, 52 figs.

The new species described are *Stolotermes victoriensis* from Victoria, *Calotermes* (*Glyptotermes*) *nigrolabrum, C.* (*Cryptotermes*) *primus* and *Rhinotermes* (*Schedorhinotermes*) *breinli* from North Queensland, and *Eutermes westraliensis* from S.W. Australia.

MYERS (J. G.). **The Australian Apple Leaf-hopper** (*Typhlocyba australis,* **Frogg.**).—*Proc. Linn. Soc. N.S.W., Sydney,* xlvi, pt. 4, no. 184, 23rd December 1921, pp. 473–474, 4 figs.

The Jassid recorded as *Empoasca australis,* sp. n. [*R.A.E.*, A, vii, 32] has now been identified as *Typhlocyba australis,* Frogg.

This species has been introduced into New Zealand, where it does considerable damage to apple trees and hawthorn. A description of it is given.

Veitch (R.) & Greenwood (W.). **The Food Plants or Hosts of some Fijian Insects.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvi, pt. 4, no. 184, 23rd December 1921, pp. 505–517.

In the course of investigations of sugar-cane pests of the Fiji Islands, a considerable number of food-plants and host records were obtained; a list of these is given, arranged under the orders of the insects by which they are attacked.

Fenton (F. A.) & Ressler (I. L.). **Artificial Production of Tipburn.**—*Science, Garrison-on-Hudson, N.Y.*, lv, no. 1411, 13th January 1922, p. 54.

By the injection, into leaves of potato plants, of small amounts of emulsion made by crushing the adults of both sexes of *Empoasca mali* in water, an injury was produced similar to, if not identical with, tipburn. The injection of an emulsion made from crushed nymphs only produced slight injury in a few cases. From further experiments it is evident that the insects contain some toxic substance that causes the injury. Bordeaux mixture does not apparently prevent tipburn by its action on the leaf, but rather by its action on the insect. It acts so slowly on the nymphs that tipburn was produced on sprayed leaves colonised with nymphs.

Evans (W.). *Cryptohypnus riparius*, **a Click-beetle as a possible Agricultural Pest.**—*Scottish Naturalist, Edinburgh*, no. 119–120, November–December 1921, pp. 181–182.

Cryptohypnus riparius, F., is the commonest click-beetle occurring in Scotland, and may be responsible for a great deal of the damage caused annually by wireworms. It is found almost anywhere in open country, both in cultivated and uncultivated areas. The adults occur from February to October, though most abundant in the spring.

Jackson (D. J.). **Notes on the Distribution of Weevils of the Genus** *Sitona* **in the North of Scotland.**—*Scottish Naturalist, Edinburgh*, no. 119–120, November–December 1921, p. 178.

The species recorded are: *Sitona lineata*, L., on peas, beans, tares, wild vetches, and occasionally on clover; *S. hispidula*, F., common on clover, but rare in fields near the sea; *S. flavescens*, Marsh., common on clover; *S. puncticollis*, Steph., on clover, especially on low ground or near the sea; *S. sulcifrons*, Thunb., abundant amongst clover; *S. crinita*, Hbst., rare on clover; *S. regensteinensis*, Hbst., fairly common on lupins and amongst low growing herbage; *S. tibialis*, Hbst., common on tares, wild vetches and meadow vetchling (*Lathyrus pratensis*); and *S. suturalis*, Steph., rare, only taken by sweeping clover.

Davidson (J.). **Biological Studies of** *Aphis rumicis*, **L. A.—Appearance of Winged Forms. B.—Appearance of Sexual Forms.**—*Sci. Proc. R. Dublin Soc.*, xvi, no. 25, 29th August 1921, pp. 304–322, 3 figs. [Received 1st February 1922.]

From a long series of breeding experiments and cytological investigations on *Aphis rumicis*, the author is led to the conclusion that the sequence of winged and apterous forms is largely due to some internal inherent tendency, and not to food and temperature conditions,

as many earlier workers have considered. It seems probable, however, that environmental conditions may exert an influence by restricting or encouraging metabolism and thus affecting the production of winged forms; further investigations in relation to temperature, humidity and food factors, and further cytological studies, are necessary to determine this. Winged viviparous females tend to produce apterous viviparous females, and these to produce either apterous viviparous females or a mixed progeny, including a very variable percentage of winged forms. The apterous condition is to be regarded as an adaptation to seasonal food and temperature conditions. The great variability in the numbers of winged forms produced by apterous individuals is an important point.

The author's investigations also tend to show that the appearance of sexual forms is associated with changes in the chromosome complex rather than with food and temperature. It would appear that in some species the sexual forms develop after a definite number of agamic generations have been passed through, but this is not the case in all species, as experiments with *Callipterus trifolii*, Mon., have proved. In the case of *Siphonaphis padi*, L. (*Aphis avenae*, F.) and *Toxoptera graminum*, Rond., in America, an extension of favourable seasonal conditions appears to produce a corresponding extension of the agamic generations, which seem to be interpolated between the winter egg and the sexual generations as an adaptation to seasonal conditions. It is shown in the author's experiments that certain of the apterous, parthenogenetic females may carry on the parthenogenetic strain throughout the winter if given favourable food and temperature conditions. This cannot, however, be considered as wholly due to these two factors, because sexual forms and agamic forms appear together in each generation under the same environmental conditions.

Generalisations on the biology of the Aphids as a whole cannot, however, be drawn from the study of one species, and further investigations on their cytology, in conjunction with breeding experiments, are necessary for an understanding of their biology.

BEESON (C. F. C.). **The Bee-hole Borer of Teak. A Preliminary Note on the Ecology and Economic Status of** *Duomitus ceramicus*, **Wlk., in Burma. (Lepidoptera; Cossidae.)**—*Ind. Forest Records, Calcutta*, viii, pt. 3, 1921, 105 pp., 36 tables, 6 plates, 4 diagrams. [Received 7th February 1922.]

An introduction to this paper by Mr. A. Rodger gives a detailed account of the previous history, distribution and economic aspect of the damage caused by *Duomitus ceramicus*, Wlk., in Burma. Teak (*Tectona grandis*, L.) is the only food-plant of this moth in Burma and Java; it also occurs in Sikkim, Singapore, Nias, Ceram, British New Guinea and the Trobriand Islands. The geographical distribution of the borer in Burma seems to coincide with the distribution of the teak tree. It occurs in localities with a rainfall of 50 to 150 in., and at elevations of 250–2,000 ft., but decreases in abundance towards the dry zone and towards regions of high elevation and heavy rainfall.

A full description is given of all stages of this Cossid, together with its life-history, habits and natural enemies. In captivity a single female will deposit 300–600 eggs in four to six days. These are usually laid in cracks and under the scales of the bark. No field records are available for the duration of the egg stage. The youngest larva was found on 21st May. The food of the larvae is partly sap and partly

callus tissue. They continue feeding during the growing period of teak and prepare to pupate towards the end of the cold weather or as soon as the leaves begin to fall. Woodpeckers are the chief natural enemies. The larvae are parasitised by Tachinid flies, possibly belonging to two species, and at least one species of Hymenopteron. They are also attacked by a fungus, (?) *Cordyceps* sp. Other bee-hole borers of teak include the moths, *Phassus signifer*, Moore, and *P. malabaricus*, Wlk., and the Longicorns, *Aristobia birmanicum*, Gahan, and *Haplohammus cervinus*, Hope.

Some statistical data are recorded in detail, and certain of the conclusions arrived at are that vigorous trees are attacked by *D. ceramicus* in preference to weak or decadent ones. The average number of holes per tree is directly proportional to the girth. Individual trees frequently escape attack for several years. The liability of larvae to successful development is proportional to the richer food supply afforded by vigorous trees. The annual incidence curves show that the borer usually appears early in the life of the plantation, and may appear as early as the second year after foundation. The most important fact arising from the data is the recognition of a very low rate of increase and frequent natural reductions in the mean annual incidence. This suggests that a possible method of control in plantations lies in the production of a high girth-increment in individual trees, so that the wood-increment outstrips the borer-increment. There are indications that thinnings can be carried out so as to reduce the incidence of the borer. The data on the effect of undergrowth are contradictory, and the conclusions arrived at in 1918 are not of general application [*cf. R.A.E.*, A, vii, 135].

In plantations and regeneration areas of pure teak of more or less even age the following remedial measures are suggested. Thinnings should commence early and recur at short intervals, and they should be carried out so as to produce a high girth-increment in individual trees. In early thinnings or cleanings, trees showing bee-holes should be cut out unless their retention is essential, but in the middle period of the rotation the presence of visible bee-holes should not influence the selection or rejection of trees. In thinnings the suppressed and dominated trees should be cut out and not left standing, as it is evident they do not act as trap trees, but are sources of infestation in the more vigorous ones. The most favourable time to fell is between August and December. If trees are felled early in the year, the borers in the mature larval and pupal stages will complete their development successfully.

Beeson (C. F. C.). **Recent Work in Forest Entomology.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 182–183.

Studies have been carried on during the last two years on the borers of sal (*Shorea robusta*) and the trees associated with it in sal forests, and of teak (*Tectona grandis*) and its associates. The most important sal borers are *Hoplocerambyx spinicornis*, *Aeolesthes holosericea* and certain Platypodids. The first-named has occurred in epidemic incidence as a primary pest killing living sal trees [*R. A.E.*, A, ix, 216], though normally it is a borer of felled or killed timber. The effect of rainfall on the metabolism of the early larval and pupal stages has been studied, and it has been found that the incidence of emergence

of the beetle synchronises with that of the rainfall in the first few weeks of the monsoon. In a wet year 75 per cent. of the beetles emerge in the first month of the rains; in a dry year the period is prolonged to six or eight weeks. Similar work on the emergence periods is being done with other species of borers. It is believed that the control of borers of this class will be obtained by modifications of the felling and seasoning rules.

Teak borers include *Duomitus ceramicus* (bee-hole borer), *Haplohammus cervinus, Phassus malabaricus*, etc. Investigations on the bee-hole borer, which is the most important, are recorded in detail in the preceding abstract.

HUSAIN (M. A.) & BHASIN (H. D.). **Preliminary Observations on Lethal Temperatures for the Larvae of** *Trogoderma khapra*, **a Pest of Stored Wheat.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 240–248, 1 plate, 2 charts.

The two problems that require to be solved for the successful storing of grain are the rendering of it free from all stages of insect life before storage, and the keeping of it free from insects when stored. The methods devised for these purposes include processes which aim at accomplishing both of these objects by means of a single operation. Under this heading come the use of naphthaline balls, of castor oil and other oils, of mercury, the mixing of sand with the grain or covering the grain with a uniform layer of it, and the hermetical sealing of the grain. This last method, if found successful, should be the simplest and best for grain storage. In a second category are those processes in which the grain is first subjected to treatment to free it from infestation, and is then kept in insect-proof stores. These include fumigation, mechanical separation of the insects from the grain, and superheating. All these methods are briefly reviewed, the author pointing out that there is at present no really satisfactory method that can be recommended generally, especially for grain in bulk.

An instance of the difficulty of treatment is the elevator at Lyallpur, containing 32 bins, eight of which have a total capacity of 2,938 tons. Wheat in this elevator was found to be infested with *Trogoderma khapra* at the top and with *Rhizopertha dominica* at the bottom of the bins. Though the temperature of the bins filled with wheat was found to rise as high as 113° F., the insects remained unaffected. It has been stated that a temperature of 110° F., maintained long enough to penetrate the tissues of the insects, kills all grain pests, but it would appear that insects in the tropics, which are accustomed to high temperatures, can stand excessive heat better than those in cooler regions.

In view of these considerations, experiments were undertaken with the larvae of *T. khapra*, the commonest wheat pest in the Punjab and the one of which the larvae are most resistant to high temperatures. The apparatus devised for exposing the insects to varying temperatures is described and the results recorded. At 185° to 212° all insects were dead after 30 seconds; at 122° all were dead after five hours, with proportionate periods for intermediate temperatures. The effects of various high temperatures on the germinating capacity of wheat of different types are discussed; all types tested gave 100 per cent. germination after 15 to 20 minutes exposure to 212° F.

MISRA (C. S.). *Anatrachyntis falcatella*, **Stt.** (*Pyroderces spodoctha*, **Meyr.**).—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 249–252, 1 plate.

This moth, which has hitherto been recorded as a rubbish feeder, has recently been observed infesting broodlac [*Tachardia lacca*] on *Shorea talura*. From four different consignments received from Bangalore, so many moths emerged that it seemed highly probable that the caterpillars were not harmless, and investigation showed that they were feeding on the healthy lac females within resinous cells. The caterpillars are often found in company with *Eublemma amabilis*, and in the consignments examined were far the more numerous. *E. amabilis* is a serious pest of lac in northern India, and also occurs to a less extent in the south; *Anatrachyntis falcatella* has not been reported as damaging lac in northern India. In the Pusa collection it has usually been taken from cotton buds or dry shoots attacked by other cotton pests. Both species attack and destroy the gravid females of the lac insect, the caterpillars gnawing a hole in the resinous cell, and in order to reach the dead and dry female lac cells they bite their way through the living female cells as well. When fully fed, and after having penetrated to a certain depth, the caterpillar spins a thin, whitish cocoon, having first made a circular exit hole for the adult on the resinous incrustation. If this moth, in the course of time, diverts its attention from cotton to lac, it will require rigorous measures for its suppression, and this should be borne in mind when the question of the establishment of nurseries for the distribution of broodlac is discussed.

MISRA (C. S.). **Determination of Emergence of Larvae from Examination of the Ovaries of Lac Insects.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 253–258, 1 plate.

The determination of the local dates of emergence of lac insects has always been a difficult matter, and this ignorance has largely handicapped the successful extension of lac cultivation, as well as contributing to bring about the frequent heavy fluctuations in the price of the material. As the future seems to hold great possibilities for the development and consolidation of the industry, it is essential that adequate precautions be taken to safeguard it. It is of the greatest importance that broodlac intended for transportation should be cut at exactly the right moment with regard to emergence of the larvae, and a method is explained for determining this moment in any part of the country. A plate shows the development of the eggs in the lac insect up to the moment of emergence of the larvae. By the examination of a few of the ovaries of females taken from the cells, and a comparison with the figures on this plate, the date of emergence in the particular locality from which the insects were obtained can be determined. The drawback to this method is that it is only suitable for laboratory workers possessing a microscope, and cannot be attempted by most of the poorer growers.

DUTT (G. R.). *Gracilaria soyella*, **van Dev., and its Parasite,** *Asympiesiella india*, **Girault.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 287–290, 1 plate.

Gracilaria soyella, van Dev., occurs every year at Pusa, generally in fields of tur (*Cajanus indicus*), from November to March or April. The caterpillar rolls up the apical extremity of the leaves and lives

within the fold, eating the epidermis until the folded portion of the leaf may be skeletonised and dry up. Pupation occurs within the leaf-fold and lasts about eight or nine days.

Its numbers are reduced by the Chalcid parasite, *Asympiesiella india*, Gir., the larva of which feeds externally on the body of its host, consuming all but the integument within two days. Its life-cycle, from egg to imago, requires 13 or 14 days in January and February.

SUSAINATHAN (P.) & SUNDARAM (C. V.). **Life-history Notes on** *Stauropus alternus*, **Wlk.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 291–292.

Observations are recorded on *Stauropus alternus*, Wlk., reared from eggs taken on leaves of *Cajanus*. The eggs were collected on 27th November 1920, and the adult emerged on 11th January 1921. The six larval instars, with the dates of the moults, are described. The pupa is enclosed in a slight cocoon of yellow fibrous silk covered over by leaves.

HUSAIN (M. A.) & MATHUR (U.). **Preliminary Observations on the Oviposition and Life-history of** *Microbracon lefroyi*, **a Braconid Parasite of** *Earias insulana*.—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 298–311.

Earias insulana, Boisd., and *E. fabia*, Stoll (spotted bollworms), are such inevitable pests of cotton in the Punjab that damage to the extent of about 10 per cent. has been considered normal. In occasional years, however, they increase enormously and become very serious pests. The parasite that has been considered the most effective in reducing their numbers is the Braconid, *Microbracon* (*Rhogas*) *lefroyi*, Ashm. Although the distribution of boxes of these parasites has gone on for a number of years, no investigations have been made as to the results, and very little has been known regarding their life-history. The parasite is apparently more susceptible to low temperatures than the bollworms, and thus, after an exceptionally cold winter, the latter may be more than usually numerous. There are probably several species of *Microbracon* parasitic on *E. insulana* and *E. fabia*. Brues' description of *M. lefroyi* is quoted. The occurrence of the parasite in the Punjab varies according to the locality. In the south, they have been collected in July and August; at Ferozepur they are seen in September and October, and at Lyallpur in November to January.

The manner of parasitisation is described. After puncturing the body of the host caterpillar, generally in the abdominal region, the female sucks the liquid oozing from the wounds; in the laboratory the food thus obtained seems sufficient for the parasite. The eggs are laid outside the body of the host, in groups of from 2 to 6 or more, and always on a fully-grown caterpillar. The largest number of eggs found on one caterpillar was 21, but 219 have been obtained from one unfertilised female. The parasitic larva hatches in from 24 to 26 hours, and begins to suck the body-juices of its host, probably utilising the wounds made by the female for this purpose. The larval stage lasts from 32 to 37 hours in July, about 67 hours in October, and more than 10 days in December. When fully fed the larva leaves the host and pupates, generally close to it, in a white silken cocoon. In the summer pupation lasts 5 or 6 days, while in winter it may be as long as 27 days. The longevity of the adult is not known; in the laboratory males

lived from 14 to 16 days and the females as long as 28 days; in captivity females that had oviposited died sooner than those that had not done so. Parthenogenesis occurs, unfertilised females producing only males.

It has been argued that *Microbracon* cannot be an effective check on the bollworms as the rate of parasitism is not very high (12 per cent. in a trial plot at Pusa). The parasite, however, is remarkably free from enemies, and lays a large number of eggs. Moreover, its life-cycle takes only 10 days in summer, while that of *Earias* takes 30. Before it can be effective, however, it must be reared artificially and liberated at the beginning of the season in very large numbers.

Tables are appended showing the daily rate of oviposition and the duration of the various stages of *M. lefroyi*.

Ramakrishna Ayyar (T. V.). **A Check List of Coccidae of the Indian Region.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 336–362.

It seems likely that increased interest will be taken in future in the Indian Coccidae, for farmers are beginning to realise their economic importance. In view of the development of the fruit industry, much attention must of necessity be given to those species that are fruit pests, and this list should be of assistance to workers in that group all over India. The geographical area included comprises the whole of British India, Burma and Ceylon, while every effort has been made to make the list as up-to-date as possible. Under each species one or two important references are given, the more important food-plants, and the chief localities in the region where the insect was observed.

Ramakrishna Ayyar (T. V.). **A List of Parasitic Hymenoptera of Economic Importance from South India.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 363–366.

This paper is supplementary to an earlier list of economic parasites [*R.A.E.*, A, ix, 214]; sixty further species are added, and many more remain to be dealt with, though the list in its present form is a more or less complete and connected record of the useful insects as far as at present known.

Ruschka (F.). **Chalcididenstudien. I. Teil.** [Chalcid Studies. Part I.] —*Verh. Zool.-bot. Ges., Vienna,* lxx (1920), no. 6–8, 30th July 1921, pp. 234–315, 43 figs. [Received 1st February 1922.]

This paper on the Eupelmidae of Europe and the Mediterranean region begins a series of studies based on the Chalcid collection in the Natural History Museum in Vienna, which is chiefly composed of Mayr's and Förster's collections. A generic key, and keys to the species of *Eupelmus* and to the females of *Calosota, Eusandalum,* and *Polymoria* are given.

Gautier (C.). **Description de deux Espèces nouvelles,** *Trioxys placidus* **[Hym. Braconidae]** et *Alloxysta gautieri,* **J. J. Kieffer [Hym. Cynipidae].**—*Bull. Soc. Ent. France, Paris,* no. 20, 28th December 1921, pp. 302–307.

The Braconid, *Trioxys placidus,* sp. n., is described from the Lyons region, where it was found in June and July as an exclusive parasite of the small apple Aphid distinguished by its green or yellow-green abdomen.

A Cynipid hyperparasite peculiar to this species, *Alloxysta gautieri,* sp. n., is described by J. J. Kieffer.

Hegh (E.). **Les Termites.**—*Bull. Agric. Congo Belge, Brussels*, xii, no. 3, September 1921, pp. 567–621, 46 figs. [Received 2nd February 1922.]

In this instalment of his monograph on African termites [*R. A.E.*, A, ix, 521] the author discusses the food of termites and the foraging expeditions of *Hodotermes*. The construction of the nest of *H. transvaalensis* is described, and short notes are given on other species of *Hodotermes* and *Psammotermes*. The leaf-cutting species are dealt with, and one section describes the construction of the fungus gardens that are characteristic of certain species.

La Maladie des Caféiers due au *Stephanoderes coffeae*, Haged.—*Bull. Agric. Congo Belge, Brussels*, xii, no. 3, September 1921, pp. 624–625. [Received 2nd February 1922.]

Coffee plantations in Java and Sumatra are reported to be infested by the Scolytid, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.), which has evidently been imported with seed from the Congo. An account of this beetle, with recommendations for avoiding infestation, is recapitulated from an earlier paper [*R. A.E.*, A, iii, 649], and reports from Java on the subject of this pest are quoted [*cf. R. A.E.*, A, viii, 447–9].

In infested plantations, all infested berries should be gathered and thrown into a 5 per cent. creolin solution. Upon arrival at the mills the creolin solution should be poured off and the berries dropped into boiling water for 15 minutes, after which they are dried. By this method all odour of creolin is removed. The collection of infested berries should be carried out each month, all the black berries being gathered as well as the green infested ones. The most severely infested fields should receive a second examination, and watch should be kept over these until the general coffee harvest begins.

Mayné (R.). **Un Insecte nuisible aux Noix Palmistes, contre lequel il y a lieu de prendre des Mesures de Protection.**—*Bull. Agric. Congo Belge, Brussels*, xii, no. 3, September 1921, pp. 635–636. [Received 2nd February 1922.]

There are two insects occurring in the Belgian Congo that are seriously injurious to *Elaeis guineensis* (oil palm). The most dangerous of these is the weevil, *Rhyncophorus phoenicis*, the larvae of which attack the heart of the palm, causing decay and eventually death. The other is *Oryctes monoceros*, and, in certain regions, the allied species, *O. boas*. The adults of *Oryctes* mine the petioles of the leaves, the galleries sometimes reaching to the heart of the plant and causing its death.

Reports on the State of Crops in each Province of Spain on the 20th of December 1921.—*Bol. Agric. Téc. Econ., Madrid*, xiii, no. 156, 31st December 1921, pp. 1031–1045. [Received 2nd February 1922.]

In the province of Jaén the fumigation campaign against *Phloeothrips oleae* was continued. In Saragossa the sugar-beet crop was severely attacked by *Euxoa* (*Agrotis*) *segetum*.

SCHELLENBERG (A.). **Bericht über eine Studienreise in deutsche Weinbaugebiete (Baden, Rheingau, Mosel, Rheinhessen, und Bayrische Pfalz).** [A Report on a Tour of Study in the German Vine-growing Regions.]—*Landw. Jahrb. der Schweiz, Lucerne,* xxxv, no. 6, 1921, pp. 725–754, 4 figs.

One section of this report deals with the efforts being made in Germany to simplify the methods for combating the vine-moths, *Clysia (Conchylis) ambiguella*, Hb., and *Polychrosis botrana*, Schiff. In Germany these moths require annual measures, and though Switzerland does not suffer to the same extent, there are certain western Swiss districts where great damage is done. As nicotine has risen to about forty times its pre-war price in Germany, arsenicals are being used, Urania green—which contains no lead—being generally employed, combined with lime-copper.

STANILAND (L. N.). **Hover Flies: Their Habits and Economic Importance.**—*Fruit Grower, Fruiterer, Florist & Mkt. Gdnr., London,* liii, nos. 1365 & 1366, 26th January & 2nd February 1922, pp. 143–144 & 185–187, 10 figs.

In these investigations to determine the species of Syrphid flies that are useful checks on Aphids, the species recorded are :—*Melanostoma scalare*, F., predacious on *Macrosiphum rosae* ; *Lasiophthicus (Catabomba) pyrastri*, L., on *Acyrthosiphon (Siphonophora) pisi* ; *Syrphus ribesii*, L., on *Macrosiphum urticae, M. rosae, Hyalopterus pruni, Aphis pomi* and *Phyllaphis fagi* ; *S. vitripennis*, Mg., on *M. urticae, Aphis rumicis, A. pomi, H. pruni, Callipterus quercus* and *Phyllaphis fagi* ; *S. corollae*, F., on *Aphis saliceti* ; *S. luniger*, Mg., on *A. rumicis* ; *S. balteatus*, DeG., on *A. rumicis, H. pruni, M. urticae* and *Callipterus quercus* ; and *S. auricollis*, Mg., on *Cavariella capreae.*

The eggs are laid singly on the surfaces of leaves wherever there are Aphids. The largest number of eggs laid by *Syrphus vitripennis* in captivity was ten. Eggs of *S. vitripennis* hatched in four days, and those of *S. luniger* in two. The larvae feed within half an hour of hatching. Experiments are described to determine the number of Aphids one larva can destroy in its lifetime, and this may rise to over 100 per diem when it is nearly mature. Pupation usually occurs on the lower surface of a leaf, while the last brood often pupates among dead grass and rubbish at the foot of the tree or plant. The winter is passed in this stage. The adults emerge in summer in 14–16 days, and it is thought that there are at least three generations a year.

The larvae collected were but little parasitised, a few Proctotrupids and an Ichneumonid, *Bassus laetatorius*, being bred from them. Some examples of *Syrphus cinctellus* were badly attacked by a fungus.

The author does not consider that any of the species mentioned, with the possible exception of *S. balteatus*, will check the woolly aphis [*Eriosoma lanigerum*]. Plants or trees attacked by Aphids should be examined for the presence of Syrphids, and if they are found, spraying should not be resorted to, as this kills the parasites as well as the Aphids. Syrphids can prevent Aphids becoming a serious pest if they are sufficiently numerous and commence work early enough in the year. They are particularly useful in checking waxy Aphids such as *Hyalopterus pruni*, which are difficult to spray.

DUDLEY (J. E.). **The Potato Leaf-hopper and its Control.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1225, August 1921, 16 pp., 14 figs. [Received 6th February 1922.]

The bulk of the information contained in this account of the life-history and control of *Empoasca mali* (potato leaf-hopper) has already been noticed [*R. A.E.*, A, ix, 492].

QUAINTANCE (A. L.). **The Peach Borer: How to Prevent or Lessen its Ravages; the Paradichlorobenzene Treatment.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1246, October 1921, 14 pp., 12 figs. [Received 6th February 1922.]

The life-history of *Aegeria exitiosa*, Say (peach borer), together with the injury it causes and the remedial measures recommended, are recorded [*R. A.E.*, A, v, 368, etc.]. A wash recommended for application after spring "worming" consists of 1 pt. lime-sulphur concentrate to 6–7 pts. water, adding lime to give it the consistency of heavy paint. A caustic wash of 1 lb. caustic soda or lye to 8 or 9 U.S. gals. water, adding 10 lb. stone lime after careful slaking, applied in the autumn destroys any borers that are more or less exposed on the tree.

In 1915 experiments were undertaken with paradichlorobenzene; the application of this material, the preparation of the trees and the injury it may cause have already been noticed [*R. A.E.*, viii, 189; ix, 325].

SIEGLER (E. H.) & PLANK (H. K.). **Experiments and Suggestions for the Control of the Codling Moth in the Grand Valley of Colorado.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 959, 8th October 1921, 38 pp., 2 plates, 21 tables. [Received 6th February 1922.]

A detailed account of the spraying experiments carried out during 1916, 1917 and 1918 for the control of *Cydia* (*Laspeyresia*) *pomonella*, L. (codling moth) in Colorado is given, together with a summary of the results.

Spray schedules based on the life-history studies of 1915 and 1916 are given and take into consideration the time each brood begins to hatch and the time when the larvae are hatching in large numbers, as well as the time hatching occurs in maximum numbers. Three sets of schedules are presented, the first involves five applications, and is intended for orchards lightly infested and for varieties on which the pest is not difficult to control; the second is for six applications for medium infestations and for varieties on which it is moderately difficult to control; while the third is for seven applications for heavy infestations and for varieties on which the codling moth is most difficult to control.

Supplementary measures include banding, which is described, and a trap as a substitute for the latter method, which has already been noticed [*R. A.E.*, A, v, 113].

WOGLUM (R. S.) & BORDEN (A. D.). **Control of the Argentine Ant in California Citrus Orchards.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 965, 18th October 1921, 43 pp., 21 figs., 2 tables. [Received 6th February 1922.]

The bionomics and control of the Argentine ant (*Iridomyrmex humilis*, Mayr) in Californian citrus orchards are recorded [*cf. R. A.E.*, A, viii, 114, 285, etc.].

Other measures include the use of pyrethrum and sodium fluoride. These substances are decidedly repellent to ants and quickly cause death when they come in contact with the bodies of the insects, but their strength is lost on exposure to air and wet weather. Pyrethrum is also effective in freeing trees of ants after banding. The success of shelter traps [*R. A.E.*, A, vi, 313] depends on rainy weather. The winter of 1917–18 in California was mild, and the ants were active throughout the season; but even under ideal conditions this method is less effective and more expensive than the use of poisoned syrups.

Arsenic in some form is the best poison for this purpose, although some non-arsenicals have been used. Watertight cans set in the ground along the main runways of the ants are useful ground traps. Arsenical syrups are not attractive in the hot summer months, when the ants are very active. They have been observed moving freely at a temperature of 117° F., but they become sluggish at 50° F., and it is then that the syrup is most effective. During the blossoming period ants are attracted to the nectar, and control is difficult. Excellent results in complete eradication have been obtained in orchards heavily infested with scales by following up the usual autumn fumigation with ant control. The authors recommend that control be started between the time the ants first appear in the spring and the beginning of July, or from the end of September until congregation into winter colonies takes place. Clean culture should be practised in orchards, and the lower branches pruned wherever possible, to prevent access to the trees except by the trunk.

It is said that this species will not tolerate the presence of other ants, of which the commonest in Californian citrus groves that are not overrun with *I. humilis* include: *Prenolepis imparis*, Say, *Formica cinerea*, Mayr, var. *pilicornis*, Emery, *Tapinoma sessile*, Say, *Dorymyrmex pyramicus*, Roger, and *Cremastogaster lineolata*, Say, var. *californica*, Emery.

MILLIKEN (F. B.). **Results of Work on Blister Beetles in Kansas.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 967, 14th October 1921, 26 pp., 22 figs., 3 tables. [Received 6th February 1922.]

Blister beetles are of much less value than formerly and must be considered injurious, and they will become more so with continued agricultural development of semi-arid areas. They devour the petals and pollen of flowers of beans, peanuts, locust trees and lucerne, but on potatoes, sugar-beet and, to a lesser extent, on Russian olives they commonly defoliate the plant. In either case the actual injury to the crop depends on the stage of growth; as the plants near maturity, the yield is lessened, but the crop is not a total loss. Defoliation of potatoes and the destruction of beans and peanut blossoms are usually disastrous. A list is given of the food-plants attacked.

A key is given to the species of *Epicauta* and *Macrobasis* collected in Kansas. Eggs of *M. immaculata* are deposited in small cavities in the soil wherever the female may be feeding. They hatch in about 12 to 14 days, and the active triungulin larvae at once search for grasshopper egg-capsules. The coarctate larvae hibernate during the winter, and they may be found late in summer or spring. Pupation occurs in May, and this stages averages about 18 days. The life-history of *Epicauta maculata* is practically identical with that of *M. immaculata*. Coarctate larvae of *E. cinerea* occur at all seasons

and wherever grasshopper eggs are to be found, and the appearance in the field of this species seems to be earlier than that of *E. maculata*. Adults of *E. sericans* were collected from June to September. This species is thought to have one generation a year and to hibernate as a coarctate larva. Adults of *E. pennsylvanica* were collected from August to November. This species evidently hibernates as a triungulin larva. Some marked variations observed in the time required for development are recorded.

Experiments on the effect of arsenicals, contact insecticides and repellents in infested fields show that attacks by the smaller beetles are easily controlled by spraying with 1 lb. Paris green with lime in 25-40 U.S. gals. water. Many of the larger species are killed by the stronger solution. Dusting with 1 lb. Paris green to 5 lb. powdered lime or with pure lead arsenate is effective against the small beetles, but is not recommended for use against the larger ones. Driving the beetles out of the field is recommended when the pest must be checked at once. The destruction of grasshopper eggs leaves the beetles without food, and any remedial measures against grasshoppers will also eliminate danger from blister beetles.

MOZNETTE (G. F.). U.S. Bur. Ent. **Dusting vs. Spraying for the Control of Insect Pests of the Avocado.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 465–469.

Serious injury is caused to avocado during the dry winter months by several pests, including *Tetranychus yothersi*, McGreg., *Heliothrips haemorrhoidalis*, Bch., and *Empoasca minuenda*, Ball. During 1918 and 1919 tests were made with various sprays and dusts for the control of these pests, the results of which have already been noticed [*R.A.E.*, A, viii, 530].

MOZNETTE (G. F.). U.S. Bur. Ent. **Control of two Scale Insects of the Mango.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 469–472.

Eucalymnatus tessellatus, Sign. (tessellated scale) and *Coccus acuminatus*, Sign. (mango shield scale) appear to be the most injurious scales occurring on mango in Florida. They both infest the lower surface of the leaves along the midribs, though when very numerous, they may also be found along the lateral veins and interstices. Reproduction continues throughout the year, causing considerable overlapping of the generations. During the spring the scales migrate from the old leaves to the new growth. In Florida *C. acuminatus* occurs also on roseapple [*Eugenia jambos*], custard-apple [*Anona reticulata*], sapodilla [*Achras sapota*] and *Allamanda*; it is also found in Grenada, Barbados, Dominica, Antigua, Trinidad, Jamaica and British Guiana, where in addition to the food-plants already mentioned it attacks bread-fruit [*Artocarpus incisa*], *Jasminum*, *Ixora*, star plum [*Chrysophyllum monopyrenum*], star apple [*C. cainito*], and nutmeg [*Myristica fragrans*].

E. tessellatus also infests coconut and roseapple in Florida and *Caryota urens* and many other palms in the West Indies.

Experiments for the control of these scales have been carried out with lime-sulphur solution, caustic potash fish-oil soap, miscible oil,

and paraffin oil emulsion, using a spray gun with a pressure of from 225 to 250 pounds. In each case the spray was directed towards the lower surface of the leaves. Lime-sulphur applied in December at the rate of 1 gal. to 40 of water and again in March at the rate of 1–50 killed about 50 per cent. of the scales; caustic potash fish-oil soap, applied at same time and interval at the rate of 20 lb. to 25 U.S. gals. water killed about 80 per cent., slight injury being noticed after each spraying, especially on the sunny side of the trees; neither of these sprays removed sooty mould. Various miscible oils applied in December at a strength of 1 gal. to 70 of water and again in March at a strength of 1–80 also killed about 80 per cent. of the scales. Some of the oils contain harmful ingredients causing injury to the foliage, and they do not spread as effectively as oil emulsions. Paraffin oil emulsion applied in December at the rate of 1 gal. stock solution to 70 of water and in March at 1–80 killed from 90 to 95 per cent. of the scales. The use of hard water with oil emulsions causes separation of the oil, resulting in severe injury to the foliage; this may be avoided by the addition of 4–5 lb. of caustic fish-oil soap to every 125 U.S. gals. of hard water.

Some emulsions, however, have a proper stabiliser incorporated with them in the course of manufacture. The results obtained depend, to a considerable extent, on the thoroughness of the application.

MORRILL (A. W.). **Arizona Wild Cotton or Thurberia and its Insect Enemies in Relation to the Cotton Industry of the Southwest.** —*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 472–478.

Experience with the cotton boll-weevil [*Anthonomus grandis*] shows that the maintenance of narrow non-cotton zones as suggested by the Arizona officials [*R.A.E.*, A, ix, 341–342] does not stop the progress of the weevil, as this pest will cross a five- or ten-mile non-cotton zone faster than if it were planted entirely with cotton. The relationship between weevil and food-plant having been disturbed, the outlawed cotton plantings become valuable as trap crops. In the circumstances the more cotton grown in the prohibited area the better would be the protection of the more important cotton sections within range of the two pests here dealt with, *A. grandis thurberiae*, Pierce, and *Thurberiphaga catalina*, Dyar (thurberia bollworm). Under natural conditions the relation of the food-supply to the former in its native habitat was such that unless the insects or the native food-plants were disturbed there was little danger of the infestation spreading to cultivated cotton in the valleys except through transportation by means of floods from the mountains. The campaign directed against the plant rather than its insect enemies made the infestation of the cultivated cotton by flight almost inevitable, as was subsequently proved by the infestation of the cotton fields by *A. grandis thurberiae* in 1920.

The existence of *T. catalina* in the same localities as *A. grandis thurberiae* must be taken into consideration in any attempt to eradicate the weevil and its food-plant in any area. The proper methods of dealing with the wild cotton problem in Arizona will be discussed elsewhere, the object of this paper being rather to point out the danger of political interference in matters that properly belong to the field of economic entomology.

SHERMAN (F.). **Observations on Natural Enemies of the Fall Canker-worm (*Alsophila pometaria*, Peck) in Forests of Southern Alleghany Mountains, in 1920.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 478–481.

As a result of repeated injury by *Alsophila pometaria*, Peck (fall canker-worm) in certain limited areas of wild mountain forests in western North Carolina during 1917–19, it was decided to make a study of its natural enemies. Among those recorded are fifteen birds and the following predacious insects : the Carabids, *Calosoma frigidum*, Kirby, and *C. scrutator*, Say, the Pentatomid, *Podisus modestus*, Dall., the Capsid, *Lygus* sp., black ants, and *Panorpa* sp. The parasitic insects are *Telenomus* sp., *Euplectrus* sp., and a Tachinid, *Sarcophaga cimbicis* or *S. latisterna*—the exact species could not be determined, as only a female was reared. Six species of Tachinids, of which *Masicera eufitchiae*, Twns., was common, and four Ichneumonids, *Amblyteles* spp., were also collected and may be parasitic on *Alsophila pometaria*. It was apparently due to the action of these parasitic and predacious enemies, especially *C. frigidum*, *Telenomus*, and *P. modestus*, that the damage caused by *A. pometaria* in 1920 was less serious than during the previous years.

HOLLOWAY (T. E.). U.S. Bur. Ent. **The European Corn Borer and the Sugar Cane Moth Borer : a Comparison.**—*Jl. Econ. Ent. Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 481–485.

The existing information on *Pyrausta nubilalis*, Hb. (European corn-borer) and *Diatraea saccharalis crambidoides*, Grote (sugar-cane moth borer) is collated in such a form as to be readily available for comparison [*cf. R.A.E.*, A, vii, 407, 411, etc.]. As a result of these comparisons it is thought that *P. nubilalis*, if introduced into the Southern States, would become even more injurious than it has been in the north.

KING (V.) & BARBER (G. W.). U.S. Bur. Ent. **Controlling the Army-worm in Southeast Missouri.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 486–488, 1 plate.

This paper is compiled by the junior author from notes left by the late V. King, to whom the remedial measures described are entirely due.

The predatory enemies and parasites of *Cirphis* (*Heliophila*) *unipuncta* (army worm) were very numerous in 1914, and included a bird, *Dolichonyx oryxivorus*, the Carabids, *Calosoma scrutator*, *C. lugubre* and *C. calidum*, the Tachinids, *Winthemia quatuorpustulata* and *Frontina aletiae*, and a Braconid, *Apanteles militaris*. The two-furrow plan without post holes is considered to be the most satisfactory method of creating a barrier against this pest in heavy soil ; on very light soil, ditches with post holes at every fourteen feet may be employed. The method of constructing and maintaining such ditches is described.

SANDERS (J. G.) & DE LONG (D. M.). **Factors determining Local Infestation of the Grape Berry Moth.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 488–490, 1 plate, 1 fig.

The remedial measures advocated against the grape berry moth [*Polychrosis viteana*, Clem.] have generally been based on the poisoning of the larvae, but, as a result of the observations here described, it

would seem that they should be directed against the overwintering pupae [*cf. R. A.E.*, A, viii, 403]. *P. viteana* does not occur as a rule in uniform abundance in vineyards, the areas of infestation depending entirely on the existence in the immediate vicinity of conditions suitable for the hibernation of the pupae, such as dry grape leaves. As the flight of the moths is limited, the same areas are reinfested from the same source each year. The worst infestations are generally caused by a combination of depressions and stretches of abandoned or uncultivated land containing a growth of sumac, bush or heavy weeds, or a generally wooded area. As long as the woodland adjoins the vineyard, it apparently does not make much difference in which direction it is, although the infestation seems heavier with such an area to the west or north-west. Satisfactory results have been obtained by burning over and clearing waste places, etc. Where trees or vegetation are left as protective windbreaks, spraying will have to be continued, but great emphasis should be placed on cultural and clean farming methods in dealing with this pest.

PARKS (T. H.). **The Effect of Time of Sowing upon the Control of the Wheat Sheath Worm** (*Harmolita vaginicolum*, **Doane**).—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 490–492.

Observations made in 1918 show that the time of sowing has a great deal to do with the degree of infestation of wheat by *Harmolita vaginicola*, Doane; all wheat sown after 1st October was severely injured, especially spring wheat. This Chalcid is probably generally distributed over the eastern half of Ohio, the greatest injury occurring in the north-eastern section. In this part of the State, at least, sowing should not be later than 1st October. These dates do not necessarily interfere with the control of the Hessian fly [*Mayetiola destructor*, Say], as the fly-free dates begin about 23rd September for this section of Ohio.

HORSFALL (J. L.). **Sources of Infestation of** *Thrips tabaci* **in Iowa.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 493–496, 1 fig.

Thrips tabaci, Lind. (onion thrips) will establish itself and begin breeding on set onions about two to three weeks earlier than on seed onions, thus allowing the possibility of an earlier generation. Set onions in the vicinity of seed onions always prove a source of infestation, so much so that it is doubtful whether the larger returns realised from the early crop compensate for this damage. Hibernation frequently occurs in lucerne fields, and, when the lucerne is cut, the thrips migrate to the onions. During recent observations it was noticed that an adjacent maize field did not serve as an obstruction to the spread of this thrips as has often been supposed. In spite of the application of nicotine sulphate in 1919, the harvested crop from a field of seed onions represented a loss of 75 per cent. over that of the previous year. Adults of *T. tabaci* were found on lucerne blossoms on 30th July after the onions were harvested, but whether they will continue to hibernate in this field, and thus threaten the onion crop in the future, cannot yet be determined. In one field the infestation was derived from

adjoining perennial multiplier onions, but was checked by the application of nicotine sulphate soap by means of a Hardie barrel sprayer with hose extension. Other sources of infestation were cucumbers grown during the winter in greenhouses, and refuse piles, or anything that would afford shelter to the hibernating adults. The destruction where possible of these hibernating places is one of the chief factors in the control of *T. tabaci*, although it is apparently frequently neglected.

Snyder (T. E.). U.S. Bur. Ent. **White-ant-proof Wood for the Tropics.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 496–501.

To protect cabinet woods from the attack of termites they should be impregnated with chlorinated naphthaline (a crystalline wax) by placing the wood in open vats containing the wax at a temperature of from 220–240° F. without previous drying of the wood. The time required for impregnation depends on the dimensions of the wood, that half an inch thick requiring only fifteen minutes. After the wood is removed from the vats, it should be carefully dried with a cloth to insure the proper adherence of shellac or varnish. Wood thus treated is slightly darker than the untreated wood, but is termite- and damp-proof. Susceptible North American hardwoods treated in this manner were not attacked after being buried in the ground for over three years with logs infested with *Reticulitermes* spp.

Construction timbers, or other timbers which are to be in contact with the ground, should be impregnated with coal-tar creosote, which is a permanent preventive against the attack by native termites.

Mercury bichloride and zinc chloride are effective for the impregnation of woods that are not to be in contact with the ground, and would be suitable for the treatment of cheap, perishable woods to be used as the core over which termite-proof veneers could be glued.

Wood pulp products may be made termite-proof by adding poisons such as mercury bichloride or carbolic acid during the process of manufacture. Coal-tar creosote is also effective for this purpose, but can only be used where the brown stain and odour resulting from it are not objectionable.

Pines are generally most susceptible to attack by termites, with the exception of certain species, such as the longleaf pine (*Pinus palustris*) of the Southern United States, the heartwood of which is extremely resinous. Certain red cedars (*Juniperus* spp.) also appear to be distasteful to termites. A list is given of the distribution in the United States, and the relative resistance, of various native woods which might be used as veneers over chemically treated woods, or in ply or laminated woods.

Jones (T. H.). *Opisthuria clandestina* **var.** *dorsalis*, **Knight, injurious to Legumes.**—*Jl. Econ. Ent., Geneva, N. Y.*, xiv, no. 6, December 1921, p. 501.

The Capsid bug, *Opisthuria clandestina* var. *dorsalis*, Knight, is recorded as injuring cowpeas, pole beans and soy beans in Louisiana. Nymphs were numerous on the leaves in July, causing the appearance of white spots.

BARBER (G. W.). U.S. Bur. Ent. **Leafhoppers injuring Woodbine.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 502–503.

The leaf-hoppers, *Erythroneura comes*, Say, and *E. vulnerata*, Fitch, and their varieties, are recorded as injuring American woodbine (*Ampelopsis* and *Parthenocissus*) in Eastern Massachusetts during 1920. Sprays are only of use where the lower surface of the leaves can be reached ; in these cases soap or nicotine solutions are advocated. Satisfactory results have also been obtained with a strong spray of water applied at intervals under considerable pressure and directed towards the underside of the leaves.

JOHANNSEN (O. A.). **A Seed Potato Maggot** (*Hylemyia trichodactyla*, **Rondani**).—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 503–504.

The Anthomyiid, *Hylemyia* (*Phorbia*) *trichodactyla*, Rond., is recorded as injuring seed potatoes in Maine. This fly is widely distributed and is fairly common in the United States, but has probably frequently been mistaken for *H. cilicrura*, Rond. (*H. fusciceps*, Sling. *nec* Zett.) (seed-corn fly). The distinguishing characters of the larvae of *H. trichodactyla*, *H. cilicrura*, *H. antiqua* and *H. brassicae* are described. The author is of opinion that the genera *Chortophila* (*Phorbia*), *Hylemyia*, *sens. str.*, and the black-legged species of *Pegomyia*, should be included under the generic name of *Hylemyia* until further knowledge has been obtained of these closely related genera.

ESSIG (E. O.). **The Argentine Ant builds earthen Protections for Mealy Bugs.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 506–508, 1 fig.

In controlling mealy-bugs and other Coccids in California, the presence of the Argentine ant, *Iridomyrmex humilis*, Mayr, is a factor that must not be overlooked. The various means by which it protects *Pseudococcus citri*, Risso, *P. bakeri*, Essig, and *P. citrophilus*, Claus., are described.

THOMPSON (B. G.). U.S. Bur. Ent. **A Home Made Mechanical Poison Bait Mixer.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 508–509, 1 fig.

The machine here described was successfully used during the grass-hopper eradication campaign in Oregon in 1919. It is constructed on the principle of a churn, and consists of a wooden box 40 in. × 40 in. × 48 in., mounted on a $1\frac{1}{4}$ in. shaft, with a wooden pulley 42 in. in diameter fastened firmly to the end of the box. The box is constructed of $1\frac{1}{4}$ in. tongued and grooved timber. One half of the side is used as a door, thus giving ample room for inserting the materials and taking out the bait. The edges of the door are felted to prevent leakage. No paddles are required inside the box, as the falling of the materials from one corner to another, while the box revolves, thoroughly mixes the bait.

It will hold 100 lb. of bran at a time, and the mixed bait is easily removed, as there are no paddles or other obstructions.

DAVIS (J. J.). **Effect of Feeding Paradichlorobenzene-treated Feed to Poultry.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, p. 509.

Maize treated with paradichlorobenzene for the destruction of the Angoumois grain moth [*Sitotroga cerealella*, Ol.] is apparently unfit for poultry food, as the flesh of the birds becomes tainted and the eggs they produce are inedible. This result has been noticed in the case of fowls fumigated with nitrobenzene for the control of lice and mites.

FENTON (F. A.) & RESSLER (I. L.). **Artificial Production of Tipburn.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, p. 510.

This information with regard to the artificial production of tipburn by means of crushed leaf-hoppers, *Empoasca mali*, has already been noticed [*R.A.E.*, A, x, 177].

ALLEN (H. W.). **Notes on a Bombylid Parasite and a Polyhedral Disease of the Southern Grass Worm,** *Laphygma frugiperda*.—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 510–511.

Laphygma frugiperda, S. & A. (southern grass worm) was very abundant in Mississippi during 1920. The chief natural checks were a polyhedral disease and the Bombyliid parasite, *Anthrax lucifer*, F. Adults of this fly were very numerous during the late summer and early autumn. The parasitised larvae of *L. frugiperda* pupate successfully, but shortly afterwards the parasites pupate within the pupal case of the host, and emerge a few days later. Of 72 pupae collected, 18 were found to be thus parasitised. Under laboratory conditions a mortality of about 37 per cent. resulted from polyhedral disease; this may be slightly higher than the incidence in the field.

JARVIS (E.). **Work of the Division of Entomology.**—*21st Ann. Rept. Queensland Bur. Sugar Expt. Sta., Brisbane*, 1922, pp. 43–46.

During 1921 experiments were undertaken to determine the value of arsenious acid in the control of *Lepidiota* (*Lepidoderma*) *albohirta*, Waterh., and *L. frenchi*, Blackb. Applications of 40–200 lb. per acre produced no result, no difference being noted between the treated and untreated areas. The occurrence of natural enemies of *L. albohirta* referred to in the previous report [*R.A.E.*, A, ix, 169] is recorded. The most effective measure is the collection of the beetles, but the author considers that the larvae only of *L. frenchi* should be collected, as this species has a two years' life-cycle, and the larval stages occupy 18 months. The collection of the beetles outside canefields is, however, not worth while, owing to their very limited range of flight. Efforts should be concentrated on *L. albohirta*, which does more damage. All small larvae unearthed during March and June are likely to be second stage *L. frenchi*, and these should be collected.

Most of the information concerning *Ceromasia sphenophori* (the Tachinid parasite of *Rhabdocnemis obscura*), *Phaenacantha australis*, Kirk., *Laphygma exempta*, Wlk., *Rhyparida morosa*, Jac., *Polyocha* sp., an unidentified Tineid moth-borer, the Scoliid, *Campsomeris tasmaniensis*, Sauss., and the fungus, *Metarrhizium anisopliae*, which attacks *L. albohirta*, has already been noticed in the bulletins and monthly reports of the Station.

Locusta australis, Brunner, was numerous in a limited area, and 20 lb. bran, 1 lb. white arsenic, 2 qts. molasses, 3 lemons and 3½ gals. water proved an effective bait. Certain areas of grass-land, corn and oats were destroyed by *Cirphis unipuncta*, Haw. The outbreak of a new grass pest, *Oncopera mitocera*, Turner, has already been noticed [*R.A.E.*, A, ix, 566]. Endeavours are being made to establish the known parasites of *Phragmitiphila truncata*, Wlk., at Ayr, where this moth is causing serious damage.

LOUNSBURY (C. P.). **[Report of the Division of Entomology for the year ended 30th June 1921.]**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, iv, no. 1, January 1922, pp. 48–54, 1 table.

During 1920–21, the most important scale-insects concerned in quarantine in nurseries were: *Chrysomphalus aurantii, C. dictyospermi, C. rossi, Diaspis pentagona, Aspidiotus perniciosus*, and *Eriococcus araucariae*.

A small proportion of pear stocks from Europe was found infested with living scale-insects. A small leaf-gall insect, thought to be *Procontarinia matteiana*, has been twice found on mango. This midge was recently introduced into Mauritius, where it has become a serious pest. No changes were made in plant export regulations, but permits were issued to admit quantities of ten pounds or less of maize, barley, and cotton seed. Mangos imported in the previous year were infested with a fruit-fly unknown in South Africa. A brief account of locust work during the year is given, together with a table showing the extent of the operations in the infested districts.

Parasites of the woolly aphis [*Eriosoma lanigerum*] and codling moth [*Cydia pomonella*] have been introduced from America and established in the country. Progress has been made in the taxonomics and biology of South African termites, the bionomics, spread and control of the tobacco slug [*Lema bilineata*] and the control of numerous other insect pests.

FELICIONI (C.). **Coltivazione della Malvarosa o Geranio da Profumeria nell' Oasi di Tripoli.** [The Cultivation of the Perfume-yielding Geranium in the Oasis of Tripoli.]—*L' Agric. Colon., Florence*, xvi, no. 1, January 1922, pp. 6–17, 4 figs., 2 plates.

Pelargonium radula is grown in the oasis of Tripoli for the essence obtained from its leaves, which is used in perfumery. The insect pests of it are mole-crickets [*Gryllotalpa*] and Melolonthid larvae. Collection of the former and fumigation of the soil with carbon bisulphide against the latter are the measures advised.

VERONESI (E.). **Sui Risultati degli Esperimenti contro la Mosca olearia.** [On the Results of Experiments against the Olive Fly.] —*La Nuova Agricoltura del Lazio, Rome*, x, no. 218, 1st February 1922, p. 14.

The experience of ten years has shown that the Lotrionte system of poison-traps for the olive fly [*Dacus oleae*] [*R.A.E.*, A, ii, 289, 452, 479] has preserved from three-quarters to four-fifths of the fruit from attack, provided it has been applied in time.

FERRIS (G. F.). **A New Species in the Hormaphidinae (Hemiptera, Aphididae).**—*Ent. News, Philadelphia*, xxxii, no. 10, December 1921, pp. 289–291, 1 plate.

A description is given of *Hamamelistes* (?) *agrifoliae*, sp. n., from small twigs and the lower surface of leaves of *Quercus agrifolia* in California. The author considers this species to be representative of a new genus, but alate specimens will be necessary to determine this definitely. Only three species of the subfamily HORMAPHIDINAE appear to have been recorded from the United States, and of these one is introduced.

SWEZEY (O. H.). **Wireworm Damage in Hamakua.**—*Hawaiian Planters' Record, Honolulu*, xxvi, no. 1, January 1922, pp. 6–10, 4 figs.

Wireworms have caused damage to sugar-cane planted in February 1921 at Hamakua. They have been collected in fields on the other Islands, but have usually been predacious on other insects and have not damaged the sugar-cane. Investigations indicate that *Monocrepidius exul* does not occur in distinct broods at definite times of the year, larvae of various ages being found all the year round. *Simodactylus cinnamomeus* occurs less frequently, but injured some cane in August. This wireworm eats the eyes, burrowing inside and eating round the joint so that the stem is easily broken apart at that point. It also burrows lengthwise.

Search in the Philippines and in Queensland for parasites of these wireworms that might be successfully introduced into Hawaii, has hitherto been unsuccessful. No results have been obtained with insecticides and repellents. Sodium cyanide, 300 lb. per acre, is said to kill all wireworms, but even 150 lb. per acre is fatal to maize plants. It may be possible to use this fumigant in sugar-cane fields at the time of planting, though it may prove too expensive for practical purposes.

DELASSUS (—). **Le Chloropicrine et son Emploi pour la Destruction des Parasites animaux.**—*Rev. Agric. Afr. Nord, Algiers*, xx, no. 131, 3rd February 1922, pp. 78–81.

The methods by which chloropicrin can advantageously be used for the destruction of insect pests are briefly reviewed, and a more extended employment of this insecticide in Algeria is advocated. Its use in connection with horse mange and against certain pests of grain and of fruit-trees has been particularly successful, and although the technique to be employed is not yet fully understood, it is thought that it will prove of considerable help to agriculturists against insects injurious to animals and cultivated plants.

STRONG (L. A.). **Quarantine Division. Reports for the Months of July and August 1921.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, x, no. 9, September 1921, pp. 381–385.

The pests intercepted during July and August were:—From New York, *Lepidosaphes beckii* on grapefruit. From Michigan, *Aphis* sp. on *Chrysanthemum*. From Ohio, *Saissetia hemisphaerica* on ferns; and *Tetranychus* sp. and *Myzus rosarum* on roses. From New Jersey, *Diaspis boisduvali* and *Eucalymnatus tessellatus* on orchids.

From Florida, *Aspidiotus* sp. on mangos. From Louisiana, *L. beckii* on oranges and lemons. From Arizona, *Heterodera radicicola* in potatoes. From Mexico, *Parlatoria pergandei* on oranges and limes, and *L. beckii* on oranges. From Porto Rico, *L. beckii* on grapefruit. From Panama Canal Zone, *L. beckii* on oranges. From Central America, *Aspidiotus cydoniae, A. cyanophylli, Chrysomphalus scutiformis, Pseudococcus* sp. and *Icerya* sp. on bananas; *Carthartus advena* and *Calandra* (*Sitophilus*) *oryzae* in avocado seed; and *Silvanus surinamensis* in mangos. From South America, *Aspidiotus* sp., *Chrysomphalus* sp., and *Parlatoria* sp. on oranges. From Argentina, *Rhizopertha dominica* in beans. From Chile, undetermined weevils in seeds. From Hawaii, *Diaspis bromeliae* and *Pseudococcus bromeliae* on pineapples and bananas; *Coccus elongatus, Saissetia nigra, Aphis* sp. and *Pseudococcus* sp. on betel leaves; *Cryptorrhynchus* (*Sternochetus*) *mangiferae* in mango seed; *L. beckii* on limes; *Ripersia palmarum, Hemichionaspis minor, Aspidiotus lataniae, Chrysomphalus aonidum, Pseudococcus* sp., *Phenacaspis* sp., and larvae of *Hypomoscoma* sp. on coconuts; *Bruchus sallaei* in algaroba beans; *Saissetia oleae, Aspidiotus rapax* (*camelliae*) and *Pseudococcus* sp. on figs; and a weevil in seed. From Raratonga, *L. beckii* on oranges. From Tahiti, *Ripersia palmarum, Chrysomphalus aonidum* and *Lepidosaphes* sp. on coconuts; and undetermined Coccids on limes. From Australia, *Chrysomphalus aonidum* on oranges. From Japan, undetermined weevils in rice candy. From China, *Pheidole* sp. on caltrop; *Bruchus pisorum* in peas; and undetermined Lepidoptera in mushrooms and beans. From Manila, undetermined Lepidoptera in mango seed. From Java, *Tetramorium caespitum, Canthon* sp., centipedes, millipedes, cockroaches, mites and Drosophilids in soil surrounding roots of plants. From Batavia, undetermined weevils in palm seed. From Egypt, *Phoenicococcus marlatti* on date-palm shoots. From Italy, undetermined larvae of Lepidoptera in a filbert nut necklace. From Spain, *Plodia interpunctella* in walnut kernels.

Hoke (G.). **Observations on the Structure of the Oraceratubae and some new Lepidosaphine Scales (Hemiptera).**—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xiv, no. 4, December 1921, pp. 337–343, 2 plates.

The following new scales are described from Mississippi:—*Lepidosaphes camelliae* on *Camellia japonica*; *Scobinaspis dentata* on maple and black haw (*Bumelia lanuginosa*); and *Mytiella sexspina* on *Citrus, Euonymus japonica* and Satsuma oranges. *M. sexspina* also occurs in Florida.

Davis (J. J.). **The Chinch Bug in Indiana.**—*Purdue Univ., Dept. Agric. Extens., Lafayette, Ind.*, Extens. Bull. 99, May 1921, 8 pp., 4 figs. [Received 11th February 1922.]

The gradual increase in Indiana of the chinch bug [*Blissus leucopterus*] since 1917 is discussed, and its distribution, life-history, habits, natural enemies and control are recorded [*cf. R.A.E.*, A, viii, 504, etc.]. There is every possible reason to anticipate a heavy infestation on wheat and other small grain crops in the spring and on maize later in the season.

The following are recommended for contact sprays against the immature chinch bugs: 1 oz. or 2 tablespoons of Black-leaf 40 to

2 U.S. gals. water, in which 2 oz. laundry or fish-oil soap have been dissolved; or a 10 per cent. kerosene emulsion, made by dissolving ½ lb. laundry or fish-oil soap in 1 U.S. gal. hot soft water (or water softened with sal soda), adding while still hot 2 U.S. gals. kerosene oil. The mixture should be thoroughly churned for ten minutes and then diluted with 17 U.S. gals. soft water for use. Where the plants are beyond recovery, pure kerosene may be used.

DAVIS (J. J.). **Cabbage and Radish Root Maggots.**—*Purdue Univ., Dept. Agric. Extens., Lafayette, Ind.*, Leaflet no. 123, November 1921, 4 pp., 3 figs. [Received 11th February 1922.]

The life-history and habits of *Phorbia brassicae*, Bch. (cabbage or radish root maggot) in Indiana [*cf. R.A.E.*, A, iv, 463], together with the experiments with corrosive sublimate undertaken in 1921 are described. Of corrosive sublimate ½ oz. should be dissolved in 1 U.S. pint hot water, and then diluted to 5 U.S. gals.; this will suffice for two or three hundred plants. Early cabbages should be treated as soon as the eggs are observed, and again twelve days later, pouring about half a teacup at the base of each plant. Late cabbage in seed-beds can be treated in the same way except that the solution should be poured along the rows in a stream. Radishes require about 1 gal. to each 35 ft. of row, and one application is usually sufficient if applied after they are above the ground. Dusting with a tablespoonful of 1 oz. corrosive sublimate mixed with 6 lb. hydrated lime or gypsum at the base of each plant is recommended, but should not be used on seed beds, as it may scorch the very small plants. The demonstrations showed that no effective control is apparently possible when the larvae are one-third grown.

MORRILL (A. W.). **The Citrus Thrips.**—*Arizona Univ. Coll. Agric., Tucson*, Circ. 23, August 1918, 5 pp., 2 figs. [Received 11th February 1922.]

Scirtothrips citri, Moul. (citrus thrips) causes characteristic scarring of citrus fruit, which is the most important feature of damage to old, bearing trees. Nursery stock and young planted trees are frequently severely injured by the checking and stunting of their growth. The results of extensive examinations a few years ago in the Salt River Valley of the fruit in different groves before and after picking are recorded. In the field it was found that the injury to navel oranges ranged from none to about 60 per cent. scarred sufficiently to affect the market value. There is not only a reduction in the amount of the fruit that can be sold as first grade, but a reduction in the value of that passed as first. Contrary to general opinion, the pomelo, or grapefruit, is also subject to much damage by this thrips.

Excessive injury may be prevented by spraying with lime-sulphur. The author secured fully as good results with lime-sulphur 36° Bé. diluted at the rate of 1:85 parts water as with lime-sulphur (1:85) and tobacco extract (40 per cent. nicotine, 1:1,800). For lime-sulphur solution testing 33° (the usual strength of the commercial product), the dilution should be at the rate of 1:78 parts of water. Four applications in the season are recommended, the first after most of the petals have fallen, the second 10–14 days later, the third 3–4 weeks after the second, and the fourth in August or September for the protection of late growths of foliage. This schedule is only

applicable to groves where the insects are excessively numerous; in others two applications should be sufficient. For the greatest economy and efficiency 200–250 lb. pressure is preferable. Thorough drenching, especially of the outer portions of the trees, is essential.

SANDERS (G. E.) & KELSALL (A.). **Dusts and Dusting for Insect and Fungus Control. II.**—*Scientif. Agric., Gardenvale, Quebec,* ii, no. 1, September 1921, pp. 7–14. [Received 11th February 1922.]

From the results of many experiments described in detail it is evident that dusts containing copper and arsenic are effective in controlling biting insects and also black spot disease under Nova Scotia conditions. Some commercial Bordeaux powders are possibly as effective as the copper-arsenic dust, but can never be as cheaply made. Sulphur-lead-arsenate dust is slightly more expensive than the spray, while the latter is more expensive than copper-arsenic dust. Dusting possesses certain definite advantages over spraying for biting insects, and therefore it seems inevitable that copper-arsenic dust must in the future play an important part in plant pest suppression.

TOTHILL (J. D.). **Natural Control Investigations in Canada.**—*Scientif. Agric., Gardenvale, Quebec,* ii, no. 1, September 1921, pp. 20–22, 3 figs. [Received 11th February 1922.]

The introduction into Canada of the natural enemies of certain well-known pests for purposes of control is reviewed. In addition to those dealt with in previous papers [*R.A.E.*, A, iv, 178; viii, 147], mention is made of a predacious beetle that has recently been introduced against the oak looper [*Ellopia somniaria*], which periodically defoliates oak trees in the neighbourhood of Victoria. The result is not yet known.

BRITTAIN (W. H.). **The Apple Sucker** (*Psylla mali,* **Schmidb.**) **in Nova Scotia.**—*Scientif. Agric., Gardenvale, Quebec,* ii, no. 1, September 1921, pp. 22–24, 2 figs. [Received 11th February 1922.]

The present distribution of *Psylla mali,* Schmidb. (apple sucker), in Nova Scotia, its habits and seasonal history, the damage caused, and remedial measures are discussed [*R.A.E.*, A, ix, 385]. Besides nicotine spray or dust mixtures, a heavy lime wash may be applied to the trees when the buds are swelling and begin to show green at the tips. The wash consists of 100 lb. lime, with 20 lb. salt to 100 gals. water. A second application should be made as soon as the first is dry. Though this method is very troublesome, as all the smallest twigs must be covered so that any eggs on them receive a thorough coating, it will be found to give good results.

LIST (G. M.) & NEWTON (J. H.). **Codling Moth Control for certain Sections of Colorado.**—*Colorado Agric. Expt. Sta., Fort Collins,* Bull. 268, July 1921, 31 pp., 6 plates, 5 figs. [Received 11th February 1922.]

Much information and useful recommendations against *Cydia pomonella* (codling moth), as applying especially to Delta County and all other sections of Colorado except the lower Grand Valley, are given in this paper.

HARGREAVES (H.). **Report of the Government Entomologist for 1st April to 31st December 1920.**—*Uganda Dept. Agric. Ann. Rept., 1920, Entebbe,* 1921, pp. 46–48. [Received 13th February 1922.]

No new insect pest was reported during the period under review. Many of the pests of cotton, coffee and cacao, recorded in previous reports, occurred [*R.A.E.*, A, viii, 243, etc.]. No reports were received of serious damage to rubber by insects. Severe outbreaks are recorded of the butterfly, *Acraea terpsichore*, L., on sweet potato. Hand collection of the caterpillars was found to be the only practical control method. As they are gregarious in their earlier stages timely action greatly facilitates this. *Ceratitis capitata* was recorded as a pest of mango.

SUBRAMANIA IYER (T. V.). **Notes on the more Important Insect Pests of Crops in the Mysore State. II. Lepidoptera**—*Jl. Mysore Agric. & Exptl. Union, Bangalore,* iii, no. 3, September 1921, pp. 120–127, 2 figs. [Received 13th February 1922.]

Amsacta albistriga, Wlk., is only found in sandy-loam soils and causes serious damage to early sown crops, including pulses and cotton. A female may lay as many as 600–700 eggs; these hatch in about four days, pupation occurring a month later. The larvae hatching from the end of May to the second week in June are the most destructive, as those appearing later are heavily parasitised by a Tachinid. There is one generation a year. Hand-picking the sluggish adult moths is the most effective measure. They usually emerge in numbers the third day after a heavy rain and on cloudy and windy days in June. *Diacrisia obliqua*, Wlk., is only occasionally a serious pest of castor, lablab and horsegram. Hand-picking the leaves containing the young gregarious larvae is the best method of control.

Other pests of castor include the caterpillars of *Achaea janata*, Dru., (castor semi-looper), which are sometimes found at the end of July and early August, and sometimes only in September. There are two generations a year, the first causing the greater damage. The adults are fruit feeders. Remedial measures are hand-picking of the larvae in the early stages, and destruction of stray plants in gardens. Scattering cooked rice in the fields also attracts birds, which eat the larvae in numbers. The second generation larvae are heavily parasitised by three species of Braconids and by a Tachinid. *Dichocrocis punctiferalis*, Gn., occurs on castor pods in October and November. Stray plants in gardens and the first attacked fruit pods and fruit-stalks containing the insects should be destroyed. In the North, larvae of *Orgyia postica* are occasional pests about September and October.

Larvae of *Utetheisa pulchella*, L., are occasional pests of sunn hemp [*Crotalaria juncea*] in March and April. Spraying with lead arsenate and Paris green was effective on a small area, and hand-picking and destruction of the larvae in the very early stages of attack is fairly effective. In the cold season, November-January, *Simplicia robustalis*, Gn., is an occasional pest of ragi earheads in the stack. The most effective control method is to thrash the crop directly the presence of the insects is noted.

The weevil, *Apion amplum*, Fst., has been identified as a pest of black gram.

LEWIS (A. C.). **Annual Reports of the State Entomologist for 1919 and 1920.**—*Georgia State Bd. Ent., Atlanta,* Bulls. 58 & 60, May 1920 & 1921, 27 pp., 2 maps ; & 32 pp. [Received 14th February 1922.]

The various inspections undertaken during the years 1919 and 1920 in Georgia are recorded. Brief accounts are given of the insects and diseases observed during these years and the measures undertaken for their control. Dusting experiments with calcium arsenate for the control of the cotton boll-weevil [*Anthonomus grandis*] have already been noticed [*R. A.E.*, A, viii, 302 ; ix, 20].

MILSUM (J. N.). **The African Oil Palm in Sumatra.**—*Agric. Bull. F.M.S., Kuala Lumpur,* ix, no. 2, April–June 1921, pp. 90–104. [Received 14th February 1922.]

The pests of the African oil palm [*Elaeis guineensis*] in Sumatra are practically the same as those of the coconut. In one district a large block of oil palms were badly attacked by a Psychid, which killed the majority of the leaves. Reproduction of this moth is rapid, the female producing about 3,000 eggs. The pupae are frequently attacked by a Tachinid parasite. Spraying the palms with one part Paris green to 1,000 parts water by means of a power sprayer is considered the most effective method of destroying the pest. It is, however, an expensive one, particularly when the palms are tall, so that much may be gained by periodical inspection and prompt treatment immediately infestation is noticed. Both *Oryctes rhinoceros* (coconut beetle) and *Rhynchophorus ferrugineus* (red weevil) are becoming troublesome. Among minor pests are the larvae of *Melissoblaptes rufovenalis*, which tunnel in the nearly ripe nuts.

CORBETT (G. H.). *Oryctes rhinoceros*, **L. (Black or Rhinoceros Beetle).**—*Agric. Bull. F.M.S., Kuala Lumpur,* ix, no. 2, April–June 1921, pp. 114–121, 1 plate. [Received 14th February 1922.]

Leefmans' paper on *Oryctes rhinoceros*, L., in Java [*R. A.E.*, A, ix, 45–49] is considered to contain such useful information that a résumé of the English summary to the paper is given, for the guidance of planters in Malaya, while the author adds certain remarks and criticisms of his own. The beetle has been under observation in Kuala Lumpur for some months, and the life-history figures obtained are similar to those given by Leefmans. At Kuala Lumpur, the incubation period is from 10–18 days, as compared with 11–13 in Java, and the pupal stage requires rather longer than 19–27 days ; in Malaya there is also an inactive larval stage in the cocoon prior to the larva pupating. Additional breeding-places in Malaya are the bark of *Melaleuca leucadendron*, though the communal refuse heaps of the villages are undoubtedly the most important ones.

With regard to the recommendations for the burying of tree-trunks, and the ordinance proclaiming the necessity of uprooting dead or badly infested trees and burying them at a depth of not less than three feet, it is pointed out that this enactment was evidently framed with regard to the fact that beetles, grubs and eggs might be in the decayed wood, and is not designed merely to prevent the adults from ovipositing in the wood. The criticism is also made that, in the case of the experimental pits described in the Javan investigations, the figures would have been much more convincing if the treated and

untreated pits had not been placed alongside each other, as the beetles would probably follow the line of least resistance and breed in exposed breeding-places rather than trouble to find the covered ones. Top dressing with sand or market refuse is not advocated for Malaya, on the grounds of sanitation and also the difficulties of proper supervision, as it is thought the refuse might easily be exposed by rain. The chief problem remaining in Malaya seems to be the destruction of village refuse and manure heaps, and for this purpose simple and inexpensive incinerators are advocated. Such an incinerator and its possibilities will be described in a subsequent paper. The author considers that the wisest procedure with coconut stumps in Malaya is to cut them up and burn them in heaps; burying, although permitted by law, is considered an objectionable practice from a sanitation point of view, even if well done.

Pit traps are considered undoubtedly useful under certain conditions, but it is thought that to rely upon the owners of small estates in Malaya for the regular collection of the insects in the pits would lead to disaster. The poisoning of heaps intended for manurial purposes might be recommended in extreme cases, but the fact that more than nine months must elapse before use tends to preclude any advantage that might accrue from this practice. The author is convinced that if the estate owners in Malaya were to destroy the breeding-places in the vicinity of coconut palms, and if the village authorities would show active interest in the destruction of village refuse, there would be no need for adopting other remedial measures for *Oryctes*.

South (F. W.). **Work of the Inspection Staff, April 1st to June 30th 1921.**—*Agric. Bull. F.M.S., Kuala Lumpur*, ix, no. 2, April-June 1921, pp. 155-158. [Received 14th February 1922.]

Numerous local attacks of *Brachartona catoxantha* have been recorded during the quarter under review, but the moth has generally been checked by natural enemies, especially by a fungus disease. In one somewhat serious case, involving about 200 acres of coconuts, the remedial measures used have been netting the moths and spreading the fungus, either by pinning infected leaves amongst the trees or by spraying trees with water containing the fungus taken from pure cultures. Some success has been obtained, and the work is being continued.

The skins of limes in Perak are mined by the larvae of a Dipteron, which causes the fall of many immature fruits.

Campbell (J. A.) & Taylor (W. H.). **Lemon-culture. Directions for New Zealand Growers.**—*N.Z. Jl. Agric., Wellington*, xxiii, no. 6, 20th December 1921, pp. 330-335.

A brief account is given of the chief pests of lemon trees and the methods of controlling them. They include *Icerya purchasi* (cottony cushion scale), against which *Novius cardinalis* has been introduced; *Saissetia* (*Lecanium*) *oleae* (black scale), controlled by the introduced Coccinellid, *Orcus chalybaeus*; *Chrysomphalus aurantii* (*Aspidiotus coccineus*); *C.* (*A.*) *rossi* (round black scale); *Diaspis santali*; *Pseudococcus* (*Dactylopius*) *adonidum*; *Myzus cerasi* (black aphis); *Tortrix excessana* (leaf-roller); thrips; and borers. The importance of good cultivation and clean surroundings for the protection of the trees against pests and diseases is emphasised.

Amendment No. 13 (No. 1 of 1922) to the Regulations under the Destructive Insect and Pest Act.—*Canada Dept. Agric., Ent. Branch, Ottawa*, 14th February 1922. [1 p., MS.]

By an Order in Council passed on 7th February 1922, the following are added to Section 18 of the Regulations under the Destructive Insect and Pest Act:—*Popillia japonica*, Newm. (Japanese beetle); *Epilachna corrupta*, Muls. (Mexican bean beetle); *Cylas formicarius*, F. (sweet potato weevil); *Stilpnotia salicis*, L. (satin moth); and *Eriophyes ribis*, Nal., *E. avellanae*, Nal., and *E. vermiformis*, Nal. (hazelnut blister mites).

FAHRINGER (J.). **Beiträge zur Kenntnis der Lebensweise einiger Chalcididen.** [Contributions to the Knowledge of the Habits of some Chalcids.]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvi, no. 11–12, 1921, pp. 228–235, 3 figs., & xvii, no. 1–2, 15th January 1922, pp. 7–13.

These are the first two portions of a paper on Chalcid parasites issued as a result of breeding experiments. The species dealt with are chiefly parasites of Cynipids.

AHLBERG (O.). **Zur Identitätsfrage von** *Trichothrips pini*, **Halid.** [On the Identity of *T. pini*, Halid.]—*Ent. Tidskr., Stockholm*, xlii, no. 2, 1921, pp. 107–111, 3 figs. [Received 13th February 1922.]

Phloeothrips pini, Hal., has been accepted for many years as distinct from *Trichothrips ulmi*, F., but the author gives reasons for treating it as nothing more than a larger form of *T. ulmi*. *T. ulmi*, F., therefore has the following synonyms:—*fungi*, Zett., *pini*, Hal., *aptera*, Duf., and *parvipennis*, Reut.

T. ulmi is known only from Sweden, Germany, Finland and England. In Sweden it is one of the commonest bark thrips, being found in numbers under bark in late summer and in autumn. Only winged females occur in summer, and these appear to reproduce parthenogenetically.

SPESSIVTSEFF (P.). **Beitrag zur Kenntnis der Borkenkäferfauna Schwedens.** [A Contribution to the Knowledge of the Bark Beetle Fauna of Sweden.]—*Ent. Tidskr., Stockholm*, xlii, no. 3–4, 1921, pp. 219–223. [Received 13th February 1922.]

Pityophthorus trägårdhi, sp. n., is described from specimens taken in July 1921 from crown branches of fallen spruces in North Sweden. Both the mother galleries and those of the larvae are very superficial and do not touch the sapwood, but the pupal chambers leave unmistakable, though shallow, traces in it.

Examples of *Ips duplicatus*, Sahlb., from pine and spruce in August 1921, were females engaged in oviposition and in mining stems felled in June; *I. typographus* occurred close by. As the spring had been early and warm they probably belonged to the second generation. It is improbable that they resulted from an accidental importation from Finland or Russia. *I. duplicatus* is very rare in western Europe; in eastern Europe it almost always occurs together with *I. typographus*, replacing *I. amitinus*, Eich. In North Russia *I. duplicatus* has often been confused with *I. typographus*; the differences between the two species are described.

VALLEJO (E. L.). **Instrucciones para combatir la Plaga de Langostas.** [Instructions for combating the Locust Pest.]—*Rev. Agric., Mexico*, i, no. 7, 1st December 1917, pp. 288–289, 3 figs. [Received 13th February 1922.]

The Section for Bacteriology of the Department of Parasitology, of the Department of Agriculture, Mexico, supplies sealed tubes of cultures of *Coccobacillus acridiorum* for use against locusts. These cultures require to be developed and inoculated by a bacteriologist if the method is to be successful.

Algunas Maneras de combatir las Hormigas. [Some Methods for combating Ants.]—*Rev. Agric., Mexico*, ii, no. 7, 1st June 1918, pp. 304–306. [Received 13th February 1922.]

A useful poison-bait for ants is made by boiling 15 lb. of granulated sugar and 108 grains of tartaric acid crystals in 7 pints water. After cooling this must be mixed with a cooled solution of 324 grains sodium arsenite in 17½ fluid oz. hot water, to which 24½ oz. of honey has been added when cool. This bait is stable at high temperatures and remains attractive for a long period. The quantity of poison must not be increased, otherwise the ants will not have time to carry the bait into their nests. The latter may be flooded with a liquid prepared by diluting with 48 parts water one part of an emulsion of 1 lb. soap and 1 pint carbolic acid (black, 100 per cent.) in 1 gal. water. A poisonous banding, which must not come in contact with metal, can be prepared by mixing 308 grains of corrosive sublimate with 2 oz. 54 minims of ethyl alcohol and 46 grains of shellac. Adhesive bands can be employed to protect trees.

Documentos para servir a la Historia del Gusano rosado en Mexico. [Documents relating to the History of the Pink Bollworm in Mexico.]—*Rev. Agric., Mexico*, iii, no. 11, 1st February 1919, pp. 423–428, 1 fig. [Received 13th February 1922.]

This contains Dr. A. Busck's report, dated 21st November 1918, to the Mexican government regarding the infestation of cotton in the Laguna district by *Platyedra* (*Pectinophora*) *gossypiella*, Saund. [*R. A. E.*, A, v, 389, etc.].

HERRERA (M.). **La Cochinilla o** *Pseudococcus cacti*. [The Cochineal Insect, *Dactylopius coccus*.]—*Rev. Agric., Mexico*, iv, no. 4, 15th April 1919, pp. 164–171, 2 figs. [Received 13th February 1922.]

This article describes the history of the cochineal insect, *Dactylopius coccus* (*Pseudococcus cacti*), its life-history on *Opuntia coccinellifera* and the industry and trade connected with it.

HEMPEL (A.). **Tres novos Coccideos.** [Three new Coccids.]—*Arch. Escola Sup. Agric. e Med. Vet., Nictheroy*, v, no. 1–2, September 1921, pp. 143–146, 1 plate. [Received 15th February 1922.]

The Brazilian Coccids described are *Saissetia anonae*, sp. n., from soursop; *Alecanochiton marquesi*, gen. et sp. n., from coffee; and *Tachardia artocarpi*, sp. n., from jak [*Artocarpus*], cashew [*Anacardium occidentale*] and *Terminalia catappa*.

MOREIRA (C.). **Os Insectos damninhos. XIX. O "Vermelho,"** *Cerococcus parahybensis,* **Hempel, nos Cafesaes do Estado da Parahyba.** [*C. parahybensis* in the Coffee Plantations of the State of Parahyba.]—*Chacaras e Quintaes, S. Paulo,* xxv, no. 1, 15th January 1922, pp. 28–30, 3 figs.

A withering of coffee bushes in the State of Parahyba, first attributed to soil impoverishment and weather conditions and then to infestation by a Coccid, *Cerococcus parahybensis,* Hempel, has now been traced to faulty cultivation. This scale appears to be peculiar to coffee in Parahyba, and assists in destroying weak plants on which it occurs in large numbers. Owing to the wax coating, insecticidal sprays are ineffective against it, and scrubbing the stems is advised.

C. parahybensis flourishes during the rains, but inspection in October, in the dry season, showed that a high mortality occurs, due apparently, in part, to Hymenopterous parasites.

DE RODOLPHO ARANGO (—). **A Aspersão de Liquidos insecticidas nas Arvores.** [The Spraying of Trees with liquid Insecticides.]—*Brasil Agricola, Rio de Janeiro,* vi, no. 4–6, October–December 1921, pp. 116–121, 6 figs.

This popular article describes the spraying of trees on the lines usual in the United States, and gives no new information.

PAILLOT (A.). **"Tanglefoot," a Means of Controlling** *Operophthera (Cheimatobia) brumata* **and** *Hibernia defoliaria,* **Macrolepidoptera injurious to Fruit Trees in France.**—*C.R. Séances Acad. d'Agric. France, Paris,* vii, no. 10, 1921, pp. 274–277. (Abstract in *Int. Rev. Sci. Pract. Agric., Rome,* xii, no. 5, May 1921, pp. 653–654.) [Received 15th February 1922.]

American "tanglefoot" is recorded as most effective for banding fruit trees against *Cheimatobia (Operophthera) brumata* and *Hybernia defoliaria.* About 1 lb. is sufficient for twenty trunks of average girth.

TSCHERMAK (E.). **The Bean Weevil** (*Acanthoscelides obtectus*) **in Austria.**—*Wiener Landw. Ztg., Vienna,* lxxi, no. 17, 26th February 1921, p. 102, 6 figs. (Abstract in *Int. Rev. Sci. Pract. Agric., Rome,* xii, no. 5, May 1921, p. 655.) [Received 15th February 1922.]

The presence of *Bruchus (Acanthoscelides) obtectus* was first observed in small numbers at Vienna in 1918. In 1919 the beetles were more numerous, and in 1920 the bean crops were seriously infested by this pest.

PELUFFO (A. T.). *Pissodes notatus,* **Coleopteron Injurious to Pines in Uruguay.**—*La Propaganda Rural, Montevideo,* xix, no. 440, 1920, p. 2. (Abstract in *Int. Rev. Sci. Pract. Agric., Rome,* xii, no. 5, May 1921, p. 657.) [Received 15th February 1922.]

Thousands of young pine trees have been destroyed in Uruguay by *Pissodes notatus.* The larvae of this weevil were found in September 1920, the first pupae being noticed on 18th September, and the adults emerging on 6th October. There appear to be two generations a year in Uruguay.

MALLOCH (J. R.). **Forest Insects in Illinois. I. The Subfamily Ochthiphilinae (Diptera, Family Agromyzidae).**—*Bull. Illinois State Nat. Hist. Survey, Urbana*, xiii, art. 14, January 1921, pp. 345–361, 2 plates. [Received 16th February 1922.]

This paper is intended to serve as an index to the habits and the systematic relations of certain AGROMYZIDAE, and contains a complete series of records of the larval habits. The subfamily OCHTHIPHILINAE contains only seven genera, of which four are known to occur in Illinois, the others being more southern in their distribution. Except for the genus *Cryptochaetum*, they have not been considered of economic importance.

The predacious habits of the larvae, which feed on Aphids and Coccids, do not occur in any other subfamily of the acalyptrate Diptera, but are found in all species of the genus *Leucopis*, and it is possible that owing to their small size these flies have been largely overlooked. Keys are given to the genera of the subfamily and to the North American species of the genera *Pseudodinia* and *Leucopis*, *sens. lat.*

The new species described are *Leucopis pemphigae*, reared from a gall of *Pemphigus* sp.; *L. piniperda*, on *Pinus scopulorum* and other pines, and probably predacious on Aphids; *L. orbatalis*, reared from a pine twig infested with *Kermes*; *L. major*; *L. parallela*; *L. minor*; *L. americana* feeding on Aphids on black locust, *Spiraea vanhouteii* and apple, and also on *Aphis rumicis* on thistle; *Leucopis* (*Leucopomyia*) *pulvinariae*, subgen. et sp. n., reared from larvae feeding on *Pulvinaria vitis*, L. (cottony maple scale); and *L.* (*Neoleucopis*) *pinicola*, subgen. et sp. n., taken on pine trees and probably predacious on Aphids.

FLINT (W. P.). **Burn the Chinch-bug.**—*Illinois Univ. Coll. Agric., Urbana*, Extens. Circ. 28, revd. edn., December 1920, 7 pp., 4 figs., 1 map. [Received 16th February 1922.]

The wholesale burning of rubbish in which they hide in winter is recommended against chinch bugs [*Blissus leucopterus*], with which Illinois is now dangerously infested.

BURLISON (W. L.) & FLINT (W. P.). **Fight the Chinch-bug with Crops.**—*Illinois Univ. Coll. Agric., Urbana*, Extens. Circ. 30, February 1919, 14 pp., 7 figs. [Received 16th February 1922.]

One of the most effective ways of checking the chinch bug [*Blissus leucopterus*] would be to abandon the growing of maize, and to substitute crops on which this pest will not feed. Some of these include soybeans, cowpeas, beet, buckwheat, sunflowers and rape.

FLINT (W. P.) & BURLISON (W. L.). **Crop Rotations to starve the Chinch-bugs.**—*Illinois Univ. Coll. Agric., Urbana*, Extens. Circ. 39, August 1920, 4 pp., 1 map. [Received 16th February 1922.]

The life-history and food habits of the chinch bug [*Blissus leucopterus*] are recorded, together with some rotations of crops best adapted for the infested areas in Illinois, and so arranged that the minimum damage by these insects will result.

FLINT (W. P.). **Control of Insects injurious to Stored Grain and Seeds.**—*Illinois Univ. Coll. Agric., Urbana,* Extens. Circ. 40, January 1921, 4 pp. [Received 16th February 1922.]

The most effective measures for controlling insects in stored grain and seed are discussed; they include cleanliness, fumigation with hydrocyanic acid gas and carbon bisulphide, and application of heat. The use of lime is recommended against bean and pea Bruchids. Burning sulphur is fairly effective, but must be closely confined in order to penetrate masses of grain. The fumes of formaldehyde are effective as a germicide, but should never be used for killing insects.

FLINT (W. P.). **Method of Destroying Grasshoppers.**—*Illinois State Nat. Hist. Survey, Urbana,* Entom. Ser. Circ. 3, revd., February 1921, 11 pp., 8 figs. [Received 16th February 1922.]

The bionomics of grasshoppers in Illinois are briefly recorded; the remedial measures recommended and described are the use of poisoned baits and of hopperdozers.

FLINT (W. P.). **The Corn Root-aphis.**—*Illinois State Nat. Hist. Survey, Urbana,* Entom. Ser. Circ. 4, 1919, 7 pp., 2 plates. [Received 16th February 1922.]

This popular account of *Aphis maidiradicis* (corn root aphis) and its relation to the ant, *Lasius niger*, is similar to one already noticed [*R.A.E.*, A, vii, 67].

FLINT (W. P.). **Chinch-bug Barriers.**—*Illinois State Nat. Hist. Survey, Urbana,* Entom. Ser. Circ. 5, rev. edn., April 1921, 9 pp., 4 figs. [Received 16th February 1922.]

The use of the various barriers and the spray formula recommended in this paper for the control of the chinch bug [*Blissus leucopterus*] have already been noticed from other sources.

FLINT (W. P.) & MALLOCH (J. R.). **The European Corn Borer.**—*Illinois State Nat. Hist. Survey, Urbana,* Entom. Ser. Circ. 6, 1920, 7 pp., 6 figs. [Received 16th February 1922.]

The bulk of the information contained in this paper on the damage to maize by *Pyrausta nubilalis* (European corn borer) and the distinguishing characters of the smartweed borer, *P. ainsliei* (*obumbratilis*), has already been noticed [*R.A.E.*, A, viii, 450].

Though *P. nubilalis* has not yet been found in Illinois, it has recently occurred near the northern border of Ohio.

FLINT (W. P.). **The Army-worm.**—*Illinois State Nat. Hist. Survey, Urbana,* Entom. Ser. Circ. 7, 1920, 9 pp., 4 figs. [Received 16th February 1922.]

A brief account is given of the life-history, habits and control of *Cirphis unipuncta* (army worm) in Illinois. There are three generations a year in the southern two-thirds of the State, and probably throughout the whole. The larvae of the first generation cause the most damage and appear from the 20th–30th May in the south, from 1st–15th June in the centre and from 15th–30th June in the north. Pupation occurs in the south from the middle of March to the beginning of April, and

from the middle to the end of April in the centre. The adults of the first generation usually appear about the 20th March in the south, the 1st April in the centre and 10th April in the north.

The second generation rarely appears in sufficient numbers to cause much damage, but there have been outbreaks at the end of July and in August, and if there is a third generation, outbreaks occur in early September.

During nearly every outbreak of this pest there is also an abundance of *Lycophotia* (*Peridroma*) *margaritosa*, a cutworm that feeds readily on clover and lucerne, causing considerable damage, which is often attributed to *C. unipuncta*.

BROCK (W. S.) & FLINT (W. P.). **Field Experiments in Spraying for Control of San José Scale, 1919.**—*Illinois Univ. Agric. Expt. Sta., Urbana*, Circ. 239, December 1919, 4 pp. [Received 16th February 1922.]

Experiments undertaken in 1919 with proprietary compounds (chiefly forms of lime-sulphur) for the control of San José scale [*Aspidiotus perniciosus*] are described and the results tabulated.

RAMAKRISHNA AYYAR (T. V.). **An undescribed Natural Enemy of the Castor Semi-looper** (*Achaea* (*Ophiusa*) *melicerta*, **Hmp.**). —*Jl. Bombay Nat. Hist. Soc., Bombay*, xxviii, no. 1, 30th December 1921, pp. 298–300, 1 plate.

One of the most important natural enemies of the Noctuid, *Achaea janata*, Dru. (*melicerta*, Dru.), in India, is a Braconid, *Microplitis ophiusae*, sp. n. Other parasites are the Ichneumonids, *Edrisa pilicornis*, Cam., *Paniscus lineatus*, Br., *Microtoridea lissonota*, Vier., *Zamesochorus orientalis*, Vier., and the Eulophid, *Tetrastichus ophiusae*, Craw. Some of these, especially *Zamesochorus*, may prove to be hyperparasitic on *Microplitis*.

M. ophiusae appears to be closely allied to *M. eusirus*, Lyle [*R.A.E.*, A, ix, 558].

VERESTSHAGIN (B.). **Наблюденія надъ Развитіемъ вредныхъ Насѣкомыхъ и Паразитическихъ Грибковъ въ Бессарабіи въ 1918 году.** [Observations on the Development of injurious Insects and parasitic Fungi in Bessarabia in 1918.]—**Фурника** [*Furnika*], *sine loco*, no. 20, July 1919, pp. 10–13. [Received 18th February 1922.]

The insects observed include *Stephanitis* (*Tingis*) *pyri*, Geoffr., on leaves of pear; *Psylla pyricola*, Först.; *Physokermes coryli*, Ldgr., on plum; *Aspidiotus ostreaeformis*, Curt., on bark of apples and pears; *Aphis pyri*, Sch., on pears; *Hyalopterus pruni*, F., occasionally on leaves of plum; *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., under bark of apple; *Phylloxera vastatrix*, Planch., on vines; *Anthonomus cinctus*, Kollar, on pears; *A. pomorum*, L.; *Sciaphobus* (*Sciaphilus*) *squalidus*, Gyll., on currants; *Rhynchites pauxillus*, Germ.; *R. bacchus*, L., on plums; *Epicometis* (*Tropinota*) *hirta*, Poda; *Cheimatobia brumata*, L.; *Hyponomeuta malinellus*, Z.; *H. variabilis*, Z.; *Aporia crataegi*, L.;

Nygmia phaeorrhoea, Don. (*Euproctis chrysorrhoea*, L.); *Clysia* (*Conchylis*) *ambiguella*, Hb., on vines; *Cydia* (*Carpocapsa*) *pomonella*, L., in apples; *Loxostege* (*Botys*) *sticticalis*, L.; *Hoplocampa fulvicornis*, Klug, on plums; *Trichiocampus* (*Cladius*) *viminalis*, Fall., on poplars; and *Eriophyes* (*Phytoptus*) *vitis*, Land., on vine leaves.

Verestshagin (B.). **Вредители Огородничества.** [Pests of Vegetable Gardens.]—**Фурника** [*Furnika*], *sine loco*, nos. 12–13 and 14, March and April 1920, pp. 12–15 and 11–14. [Received 18th February 1922.]

The most important pests of vegetable gardens occurring in Kishinev are *Pieris brassicae*, L., *P. rapae*, L., *Barathra* (*Mamestra*) *brassicae*, L., *Plutella cruciferarum*, Z., *Haltica oleracea*, L., *Phyllotreta* (*H.*) *nemorum*, L., and *Brevicoryne* (*Aphis*) *brassicae*, L. The seasonal history and habits of these pests and remedial measures such as clean cultivation and the use of insecticides are briefly described.

Reports on the State of Crops in each Province of Spain on the 20th of January 1922.—*Bol. Agric. Téc. Econ.*, *Madrid*, xiv, no. 157, 31st January 1922, pp. 65–79.

In the province of Jaén fumigation against *Phloeothrips oleae* was continued. *Dacus oleae* was one of the olive pests that have contributed to a small crop.

Barthe (A. E.). **Oruga rosada del Algodon (Pink Bollworm),** *Gelechia gossypiella*, **Saund., o** *Pectinophora gossypiella*. [The Pink Bollworm, *Platyedra gossypiella*.]—*Rev. Agric.*, *Santo Domingo*, xiii, no. 6, 30th September 1917, pp. 166–168, 1 fig. [Received 14th February 1922.]

This article briefly describes *Platyedra gossypiella*, Saund., and its habits. Its distribution is recorded and reference is made to Order No. 80 of the Dominican Republic, the provisions of which recognise the possibility of this pest being introduced in cotton seed. A good quarantine law is needed in Dominica.

Perronne (P.). **Sur le Pyrèthre de Dalmatie.**—*Rev. Hortic. Algérie*, *Algiers*, xxv, no. 6, November–December 1921, pp. 105–108.

Pyrethrum cinerariaefolium, from which pyrethrum powder is made, is produced almost entirely in Dalmatia, Montenegro and the Adriatic Islands. The method of its cultivation is described.

The usual formula for pyrethrum-soap solution is 1½ lb. pyrethrum powder, with 2 lb. black soap to 10 gals. of water; but, however finely this powder is ground, it always blocks the jets of the sprayers; attempts are therefore being made to extract the oleo-resin of the pyrethrum by means of solvents such as alcohol, ether, or carbon tetrachloride. The liquid obtained is concentrated by distillation, the soap extract is then added, and 1 part of the mixture is mixed with 9 parts of water before use. Attention is drawn to the fact that the production of this insecticide would be easy in Algeria, that there would be a demand for its exportation, and that it is to the interest of vinegrowers, as well as profitable to them, to cultivate the plant.

VAN SLYKE (L. L.). **Composition of some of the Insecticides and Fungicides used in this State.**—*Proc. 66th [3rd] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.,* 1921, pp. 12–16. [Received 23rd February 1922.]

From an examination of nearly 200 samples of insecticides and fungicides in New York State it would seem that the chief materials used during 1920 were very generally up to the guarantee given by the manufacturers.

The materials tested were Paris green, arsenates, Bordeaux mixture, Bordeaux and lead arsenate mixtures, Bordeaux and Paris green mixtures, lime-sulphur solution, dry lime-sulphur preparations, nicotine preparations, soap and hellebore, analyses of which are given.

PARROTT (P. J.). **The Seasons Experience with Insects and Insecticides.**—*Proc. 66th [3rd] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.,* 1921, pp. 17–37. [Received 23rd February 1922.]

The more important insect enemies of apples during 1920 were three species of small leafhoppers, the injury by which is described. One of these is also a serious pest of roses. Should these insects continue to be numerous, it is suggested that nicotine sulphate be used against them. The nymphs, especially in the earlier stages, are very susceptible to nicotine, but special care should always be taken to coat the lower surfaces of the leaves.

The San José scale [*Aspidiotus perniciosus*, Comst.] has been of little importance during recent years in commercial orchards in Western New York, but should an increase of this pest be noticed, lime-sulphur at the rate of 1 to 8 should be applied, especially in orchards of large trees.

The pear thrips [*Taeniothrips inconsequens*, Uzel] is very destructive in orchards in the Hudson Valley, causing large losses in yield and reducing the vitality of the trees by injury to the foliage. Timely and thorough spraying with miscible oil and nicotine sulphate is the most promising remedial measure.

Calcium arsenate has proved as effective as lead arsenate for the control of codling moth [*Cydia pomonella*, L.], and although severe scorching occurred in several instances, this was generally avoided by adding an extra amount of lime. Hitherto calcium arsenate has been chiefly used against the cotton boll weevil [*Anthonomus grandis*, Boh.], for which purpose about ten million pounds were allotted to the Southern States during 1920. *Aphis sorbi*, Kalt. (rosy aphis) occurred in great abundance during 1920. Applications of lime-sulphur and nicotine sulphate afford a certain amount of protection, and the difficulty of reaching all the insects may be partly overcome by timely application and thorough distribution of the spraying materials.

Information with regard to toxic gases for the peach borer [*Aegeria exitiosa*, Say] and the control of sucking insects by dust mixtures has already been noticed [*R.A.E.*, A, ix, 325, 352].

STRICKLAND (L. F.). **The Pear Psylla Problem.**—*Proc. 66th [3rd] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.,* 1921, pp. 48–49. [Received 23rd February 1922.]

The pear psylla [*Psylla pyricola*, Först.] has been rapidly increasing during the past three years in New York. The factors influencing the severe infestation in 1920 were the physical condition of the trees,

belated oviposition and consequent late hatching of the first eggs of the season, and the food-supply of the insect, which was particularly abundant during the spring of that year owing to the condition of the soil.

HARTZELL (F. Z.). **Pear Psylla Investigations during 1920.**—*Proc. 66th [3rd] Ann. Meeting N. Y. State Hortic. Soc., Rochester, N. Y.*, 1921, pp. 50–57. [Received 23rd February 1922.]

During the severe infestation in 1920 by the pear psylla [*Psylla pyricola*, Först.] in Western New York, 4·36 per cent. of the total number of eggs were laid after it was too late for the spray to be effective. Sprays were applied on 3rd June, against the nymphs, containing 2 U.S. gals. lime-sulphur, 40 lb. hydrated lime, 1 U.S. pt. Black-leaf 40, and 100 U.S. gals. water. By means of this spray, 97·9 per cent. of the nymphs were killed. Where 60 lb. of kaolin was substituted for lime, the foliage was considerably injured. Bordeaux mixture (4–40–100) and nicotine, even when used with an excess of lime, caused serious russeting of the fruit. The sprays were applied at a pressure of 200 lb. Dusts composed chiefly of sulphur and containing 3 per cent. nicotine killed only 61·7 per cent. of the nymphs. Before better results are obtained with dusts, the machinery will have to be improved, and a dust used that is capable of reaching the nymphs that are enveloped in globules of honey dew.

In the discussion following this paper it was suggested by Mr. Strickland that future remedial measures be directed chiefly against the nymphs, and the following recommendations are made.

The first spray, consisting of lime-sulphur 1–8, with nicotine if scale is present, or lime-sulphur 1–40 and 40 per cent. nicotine 1 pt. per 100 gals., should be applied as soon as the adults have left their hibernating quarters, and, if possible, before oviposition has occurred. The second application, consisting of lime-sulphur 1–50, lead arsenate (paste) 2½ lb. per 50 U.S. gals., hydrated lime 10 lb. per 100 U.S. gals., should be applied to all varieties except Kieffer just before the blossom period so as to prevent scab and to kill leaf-rollers and fruit-worms. The third spray is applied after the petals drop and immediately after the eggs have hatched; it is the same as the second spray, with the addition of 1 pt. 40 per cent. nicotine per 100 gals., and with the hydrated lime increased to 40–50 lb. per 100 U.S. gals. All sprays should be directed upwards. The last spray may be repeated without the arsenate about the 1st July, to kill any second brood nymphs. The success of the sprays depends greatly on pruning; the branches of the trees should be properly spaced and the high tops removed.

FELT (E. P.). **European Corn Borer Situation.**—*Proc. 66th [3rd] Ann. Meeting N. Y. State Hortic. Soc., Rochester, N. Y.*, 1921, p. 68. [Received 23rd February 1922.]

Field work in connection with the European corn borer, *Pyrausta nubilalis*, Hb., shows that an intimate relation exists between neighbouring sources of infestation; also that early maize is more subject to attack than that planted later. In view of the serious development of injury in Ontario, where the conditions are almost identical with those of the infested area of New York, a similar rapid spread may occur at any time in the latter State, and should be carefully guarded against. Growers in infested areas are urged to adopt all reasonable precautions to remove or destroy all infested maize stalks or to hasten

their consumption by cutting or shredding before the mild weather of the next spring. Silos should be more generally utilised in the infested area, as the borers are unable to withstand the heat generated by fermentation.

Hartzell (F. Z.) & Strickland (L. F.). **Plant Lice Injurious to Apple Orchards : III. The Delayed Dormant Spray for the Control of Rosy and Green Apple Aphids.**—*New York Agric. Expt. Sta., Geneva, N.Y.*, Bull. 487, April 1921, 41 pp., 1 fig., 4 plates, 12 tables. [Received 23rd February 1922.]

This paper deals with the continuation of experimental work on the delayed dormant spray for the control of *Aphis sorbi*, Kalt. (rosy aphis) and *A. pomi*, DeG. (green apple aphis) [*R.A.E.*, A, iv, 273; v, 328].

The life-history, habits, food-plants, nature of injury and the economic importance of *A. pomi* are discussed [*cf. R.A.E.*, A, iv, 484; viii, 17, etc.], and the measures essential to adequate control, such as proper pruning, the use of a mixture toxic to the insect, and the proper time and application of the material are described.

Freezing temperatures occurred on the 24th and 25th April 1919, and destroyed so many of the Aphids that no conclusive data can be secured from the spraying experiments of that year. The experiments undertaken in 1920 are given in detail, and the results are tabulated; from these the following conclusions have been arrived at :—Comparisons between counts made in the spring and those in the summer show clearly that the extent of the season's infestation cannot be predicted from the number of Aphids present just after the eggs have hatched. The pest can be controlled for the entire season by means of the delayed dormant spray, consisting of 2½ gals. lime-sulphur, ¾ pt. nicotine sulphate, and 100 gals. water. If San José scale is present, the lime-sulphur should be increased to 11 gals. The spray should be thoroughly applied when the young leaves of the terminal buds have protruded about half-inch. If summer migrants heavily infest the trees, a midsummer application of nicotine and soap may be required in addition [*R.A.E.*, A, viii, 29]. The pressure should not fall below 200 lb., and 400 lb. is even better. The lower surfaces of the branches and leaves must be reached. A considerable amount of material is necessary for large trees, and with mature trees this varies from 7⅓ to 14⅓ U.S. gals.

Department of Entomology.—*34th Ann. Rept., 1920–21, Purdue Univ. Agric. Expt. Sta., Lafayette, Indiana*, 1921, pp. 22–23. [Received 23rd February 1922.]

The peach-tree borer [*Aegeria exitiosa*] occurs throughout the State and is probably increasing. During the spring of 1921 experiments with paradichlorobenzene gave almost 100 per cent. control, and it is hoped this method will become more generally adopted.

The cabbage or radish maggot [*Phorbia brassicae*] may be successfully controlled by the application of corrosive sublimate in solution, two applications being required for cabbages and cauliflowers. It was applied at the rate of 1 oz. to 10 U.S. gals. of water, or as a dust forming a 1 per cent. dust mixture with gypsum or hydrated lime. One treatment with the liquid was effective against this fly on radishes.

Diabrotica vittata (striped cucumber beetle) may be controlled by a dust containing 1 part of calcium arsenate to 20 parts of gypsum.

The most important pests of clover recorded during the year were *Hypera* (*Phytonomus*) *punctata* (clover leaf weevil), *H.* (*P.*) *nigrirostris* (clover bud worm), and *Hylastinus obscurus* (clover root borer).

ROHWER (S. A.) & MIDDLETON (W.). U.S. Bur. Ent. **North American Sawflies of the Subfamily Cladiinae, with Notes on Habits and Descriptions of Larvae.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lx, art. 1, no. 2396, 1922, pp. 1–46, 7 plates.

A revision of the adults and descriptive notes on the known larvae are given, as well as observations on the habits of certain species of sawflies of the subfamily CLADIINAE. Keys are given to the genera and species, and nine new species are described.

HIRST (S.). **On Some New Parasitic Mites.**—*Proc. Zool. Soc., London*, 1921, pt. 4, January 1922, pp. 769–802, 28 figs.

The new mites described include *Paratetranychus trinitatis*, sp. n., on grape-vine from Trinidad.

HENDRICKSON (A. H.). **Prune Growing in California.**—*California Agric. Expt. Sta., Berkeley*, Bull. 328, June 1921, 38 pp., 12 figs. [Received 24th February 1922.]

The prune pests dealt with include the mealy plum aphis [*Hyalopterus arundinis*], the eggs of which are laid in the autumn on the limbs of the trees and hatch the next spring; the peach-tree borer [*Aegeria exitiosa*], the eggs of which are laid from June to September, the young borers entering through the bark; and the larvae of the flat-headed apple-tree borer [*Chrysobothris femorata*], which feed in the sapwood at or near the crown.

Cankerworms, the red-humped caterpillar [*Schizura concinna*] and leaf-rollers all feed on the foliage. Mites are common, and cause yellowing and premature dropping of the leaves. Very fine dry sulphur at the rate of one-sixth to one-third of a pound to a tree, or diluted with about 50 per cent. of air-slaked or hydrated lime, is recommended for use immediately mites, such as *Tetranychus*, appear. In severe infestations, dusting should be continued at intervals of from 10–14 days. In young orchards or in windy spots the use of dry sulphur has not always been successful. Where dusting cannot be carried out sulphur paste or lime-sulphur (not stronger than 1–75 gals. water) may be used, though this sometimes injures the foliage, particularly if a period of high temperature follows the spraying.

The brown apricot scale [*Eulecanium armenaicum*] and Italian pear scale [*Epidiaspis piricola*] are of special importance, and the latter may cause the death of many limbs in badly infested orchards. The former may be controlled by a 5 per cent. distillate emulsion, a miscible oil, or a 12 per cent. crude oil emulsion, the two first being usually preferred on young trees. A 12 or 15 per cent. crude oil emulsion satisfactorily controls *Epidiaspis piricola*. The use of 1 gal. lime-sulphur to 9 gals. water is not so effective as the oils, but where it is

constantly used the scale seldom becomes serious. Spraying should be done from December to February and not too early in the winter. Trees should be sprayed when slightly damp, and not wet.

The pear thrips [*Taeniothrips inconsequens*] is a serious pest, but a new material, "Nicodust," gives promise of being the most effective remedial measure yet devised against it. A 5 per cent. strength is recommended and should be dusted on the trees when the first thrips appear in the spring. For an average prune tree one-third to one-half of a pound will be sufficient, and the application should be made between 9 a.m. and 6 p.m. The dust volatilises best when the temperature is fairly high. Other methods include irrigation after the crop has been harvested to kill hibernating thrips. In the spring some growers leave the cover crop until after the trees have blossomed, though this materially reduces the moisture in the soil, and should only be practised where irrigation is possible. A liquid spray of 1½ per cent. oil emulsion, adding 1 pt. Black-leaf 40 to every 200 gals. has also been fairly satisfactory.

State of Johore. Enactment No. 20 of 1921.—Appendix to *Johore Govt. Gaz.*, 29th December 1921, pp. 201–209. [Received 25th February 1922.]

The Agricultural Pests Enactment of 1914 is repealed and replaced by the present Enactment, dated 21st December 1921, which provides for the protection of trees, plants and cultivated products from disease and pests. By the terms of this Act, the Sultan may from time to time appoint officers with powers to enforce the Act, these officers being empowered to enter and inspect any premises for the presence of any pest or disease and to direct the destruction or treatment of any plants affected by pest or disease or likely to harbour them. Application may be made against the decision of the inspector to a supervising committee. The powers of the court and the penalties of non-compliance with the Act are enumerated. If considered advisable, land may be placed under quarantine, or may be entirely cleared of cultivation, and the provisions under which compensation may be claimed for such action are explained. With regard to locust invasions, inspection may be made for eggs or locusts, and it is incumbent upon the owner or occupier of land to report the appearance of eggs or hoppers. The rules regarding the driving of locusts and possible compensation for action taken are defined. The Act also provides for the formulating of other rules made with the object of prohibiting the entry of foreign pests or diseases and the treatment or destruction of any infested material introduced.

SIMMONDS (H. W.). **The Big Spathe Boring Moth of Coconuts.**—*Agric. Circ. Fiji Dept. Agric., Suva,* ii, no. 5, October–December 1921, p. 101.

A large spathe-boring moth of coconuts [a Cossid, *Acritocera negligens*, Butler] is widely distributed throughout Fiji, where it does much damage by destroying the young inflorescence before the bud opens. The egg is laid at the base of the spathe, and the larva bores through and burrows up among the young flowers and nuts, completely destroying those with which it comes in contact. As many as eight have been found in one spathe.

SIMMONDS (H. W.). **Coconuts and Bananas on certain Islands around the Coast of Vitilevu.**—*Agric. Circ. Fiji Dept. Agric., Suva,* ii, no. 5, October–December 1921, pp. 102–104.

A severe attack of *Agonoxena argaula* (small leaf moth) occurred around Lautoka on coconuts, but did not apparently affect the yield. The Pyralid, *Harpagoneura complena*, was present on Naviti. *Levuana iridescens* occurred in large numbers on Malolo island, as well as the scales, *Aspidiotus aurantii*, *Lepidosaphes* (*Mytilaspis*) sp., which caused practically no damage owing to the activity of parasites, and *Icerya purchasi* (cottony cushion scale). The parasites introduced against *Aspidiotus destructor* have apparently become established on the islands of Ovalau and Moturiki, but at Viwa and Naigani only the Chalcid, *Aphelinus chrysomphali*, appears to be present.

Bananas appeared to be healthy, in spite of the presence of borers, which are more fatal to the trees in dry districts than in others. The author is now of opinion that the diseased condition of bananas in the Suva district is purely the result of attack by the borer, *Cosmopolites sordidus*, coupled with lack of proper nutriment in the soil.

VEITCH (R.). **A Fungous Parasite of the Hornet.**—*Agric. Circ. Fiji Dept. Agric., Suva,* ii, no. 5, October–December 1921, pp. 114–115.

The fungus, *Isaria crinita*, is recorded as an important factor in the control of hornets, *Polistes hebraeus*, F. It has not yet been observed in the drier districts of Fiji, but a closely allied species attacks the small black bug, *Brachyplatys pacificus*, Dall., which lives on Mauritius bean and many leguminous weeds in the Lautoka district.

SIMMONDS (H. W.). *Levuana iridescens.*—*Agric. Circ. Fiji Dept. Agric., Suva,* ii, no. 5, October–December 1921, p. 121.

A Heteropterous bug is recorded as attacking *Levuana iridescens*, but these predators are apparently even less important as a check on this moth than the fungous disease that infests it.

SIMMONDS (H. W.). **A Larva which damages Para Grass.**—*Agric. Circ. Fiji Dept. Agric., Suva,* ii, no. 5, October–December 1921, p. 121.

Heliothis obsoleta (*armigera*) is recorded from Navua as attacking Para grass [*Panicum barbinode*].

Departmental Activities: Entomology.—*Jl. Dept. Agric., Union S. Africa, Pretoria,* iv, no. 2, February 1922, pp. 114–117.

Much damage has been caused to maize in the high veld by a Curculionid, probably *Strophosomus* sp. The injury generally occurs in patches of varying extent, the young seedlings being eaten away before they have reached any size. The life-cycle probably occupies about twelve months. Most of the injury is done in November and December, and the weevils disappear by the end of the year. It is assumed that they enter the soil and die after oviposition. The larvae probably emerge a few days later and begin feeding on the roots until the cold weather sets in, when they hibernate as larvae or pupae. During this stage they could probably be destroyed by frost if exposed on the surface by deep ploughing. In Rhodesia the broadcast application of arsenically poisoned green bait a few days before the young plants

are expected to appear has proved to be effective, but this method would be difficult to carry out in the high veld, where the young maize is practically the first green vegetation in the spring.

Aphelinus mali, the introduced parasite of the woolly aphis [*Eriosoma lanigerum*] is still surviving near Pretoria and at Ventersdorp, but it will apparently not prove of very material importance in suppressing the Aphid, as the present indications are that it is not adapted to the South African climate.

The maize stalk borer [*Busseola fusca*] is expected to be more abundant than usual, as a great deal of incipient attack was reported during December.

Great damage has been done in Natal and the Transvaal by the elegant grasshopper [*Zonocerus elegans*]. To protect fruit trees from this pest they should be sprayed with 3 lb. of lead arsenate paste to 50 gals. water. For peaches, apricots and plums, only 2 lb. of paste should be used. Ordinary locust poisons, whether to be used as sprays or poison baits, require to be made much sweeter than is usual for true locusts. The formula suggested is 1 lb. sodium arsenite, 6 lb. sugar and 12 gals. water. This solution is destructive to vegetation and is best spread thinly over the ground close to the plants on which the insects are feeding. In waste land the hoppers appear to be most abundant on the common milkweed (*Asclepias fructicosa*); this plant should therefore be carefully watched in the vicinity of gardens. Excellent results are obtained by fire where this method is possible. The best method, however, of dealing with this pest in gardens is by collecting the young hoppers with nets in the early morning. The newly hatched young may be destroyed by drenching with a solution of 1 lb. soap to 5 gals. water, or any other strong soapy or oily insecticide.

Armitage (H. M.). **A Practical Method of liberating Parasites of Black Scale in the Field.**—*Calif. Citrogr.*, vi, no. 8, 1921, p. 272, 3 figs. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 9, 8th February 1922, p. 861.)

In the method here described, the black scale [*Saissetia oleae*] on food-plants in individual containers is subjected to the attack of the parasite, *Aphycus lounsburyi*, in small cages, which are then moved to open racks in a heated room in order to hasten the development of the parasite. Before emergence actually takes place the containers are taken into orchards in which the parasites are to be used, and planted under the trees. By this method it is possible to place an individual food-plant, infested with a maximum of parasitised scale, under each tree in the orchard at a cost of less than £1 per acre.

Hill (G. F.). **On some Australian Termites of the Genera** *Drepanotermes, Hamitermes* **and** *Leucotermes*.—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 363–400, 4 plates, 31 figs.

This paper is intended to be the first of a series recording the results of examination of a large collection of termites from various parts of Australia. The new species described, with notes on their biology, are ***Drepanotermes silvestrii***, ***D. septentrionalis***, ***D. daliensis***, ***Hamitermes parvus***, ***H. perplexus***, ***H. perplexus*** var. ***victoriensis***, n., ***H. neogermanus***, ***H. eucalypti*** and ***Leucotermes clarki***.

SCHLUPP (W. F.). **Fumigation with Sulphur.**—*Jl. Dept. Agric., Union S. Africa, Pretoria,* iv, no. 2, February 1922, pp. 132–140.

Although sulphur as a fumigant is decidedly inferior to cyanide or carbon bisulphide, its comparative safety and cheapness render it a more suitable material for use by inexperienced persons on isolated farms and other places where, owing to circumstances, the use of other fumigants is impracticable. Sulphur fumigation is, however, only effective in very tightly sealed rooms, at the rate of 3 lb. to 1,000 cu. ft., continued for at least 24 hours. It should not be used for treating grain that is to be sown, as it affects germination. The method of preparing a room and carrying out the fumigation is described.

PARKS (T. H.) & CLAYTON (E. E.). **Controlling Tipburn or Hopperburn of Potatoes. Cooperative Demonstrations establish Value of Bordeaux Sprays.**—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster,* vi, no. 11–12, November–December 1921, pp. 168–171, 1 fig. [Received 28th February 1922.]

During 1921 demonstrations of spraying for the control of hopperburn, due to the leaf-hopper, *Empoasca mali*, were carried out in Ohio over an area of about 200 acres. The spray consisted of home-made Bordeaux mixture (5–5–50), to which lead arsenate was added for the first application to kill the potato beetle [*Leptinotarsa decemlineata*]. Spraying was begun when the plants were 6–8 in. high and repeated from 2–6 times at intervals of two weeks. In most cases 3–4 sprays were applied, 50–125 U.S. gals. of material being used per acre at each application. The general results were very satisfactory, the yield in many cases being increased by 30–35 bushels, and in one case by 82, giving an increase of 76 per cent. over the unsprayed field. Bordeaux dusts of different compositions were also tried, but the results were less satisfactory. Certain varieties of potatoes are more susceptible to hopperburn than others, but a marked increase in the yield was noticed as the result of spraying, even in the semi-resistant varieties.

COTTON (E. C.). **The European Corn Borer Quarantine Regulations for infested Ohio Areas.**—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster,* vi, no. 11–12, November–December 1921, pp. 180–186, 4 figs. [Received 28th February 1922.]

During the summer of 1921 an extensive area, involving all the counties in Pennsylvania, Ohio and Michigan that border upon Lake Erie, has been invaded by the European corn borer [*Pyrausta nubilalis*, Hb.] as the result of natural spread, probably by flight of adults from Canada. In view of the similarity of the topography, climate and type of agriculture in Northern Ohio to that of Southern Ontario, it is to be expected that this moth will increase in a similar manner in the State unless repressive measures are undertaken. All farmers are urged to adopt certain precautions, here described, based on the experience of older infested areas and the knowledge of the life-history and habits of the insect. Extracts are also given from the rules of the quarantine regulations adopted by the United States Department of Agriculture [*cf. R.A.E.*, A, viii, 511].

(6239) Wt.P.6/200 1,500 5/22 Harrow G.75.

FELT (E. P.). *Mycodiplosis moznettei*, **n. sp.**—*Florida Ent., Gainesville*, v, no. 3, January 1922, p. 46.

The midge, *Mycodiplosis moznettei*, sp. n., is described from Florida, where numbers were reared from the scale, *Pulvinaria pyriformis*, Ckll. The larvae devour the eggs of the female Coccid, and, when full-grown, construct small cocoons under the scale of the host.

WEIGEL (C. A.). **A Serious Menace to Greenhouse Roses.**—*Amer. Rose Ann., 1920*, pp. 66–69, 2 figs. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlv, no. 9, 8th February 1922, p. 859.)

The strawberry root worm or leaf beetle, *Typophorus* (*Paria*) *canellus*, F., a native beetle long recognised as a serious pest of strawberries and raspberries and occasionally of the apple, crab apple, juniper and several other plants, has been found to be of prime importance to many of the commercial rose growers of the United States. While one or two florists report that they have had experience with this pest for several years, the authentic records indicate that it has been exceptionally injurious during the last two seasons only.

The damage to rose foliage is caused mainly by the adult, and does not differ materially from the injury done to the strawberry. The entire foliage is badly perforated and ragged, presenting a shot-hole appearance as a result of voracious feeding. The beetles show a marked preference for the new and young shoots, their attack giving the rose a very unsightly appearance. Ultimately, the entire growth is badly stunted from the gradual killing of the affected parts, thereby reducing the commercial value of the plants.

Preliminary control measures have shown arsenicals to be quite ineffective, the best results having been obtained by the use of hydrocyanic acid gas against the adults. The author recommends fumigation, at night only, at the rate of 2 oz. sodium cyanide for every 1,000 cu. ft. of space, with an exposure of two hours. Growers are advised not to bring into their houses turf or soil in which strawberries or raspberries, either wild or cultivated, have been growing.

THEOBALD (F. V.). **A New Aphid Genus and Species found in England.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 429–430, 1 fig.

The Aphid, *Laingia psammae*, gen. et sp. n., is described. This new genus is intermediate between *Atheroides* and *Sipha*, the features differentiating it from these genera being given. The species was taken at Littlestone, Kent, on marram grass (*Psamma arenaria*) and meadow foxtail grass (*Alopecurus pratensis*). It is preyed upon by many species of Coccinellids, of which the chief is *Adalia bipunctata*, and by many Syrphid larvae. The grass seed was apparently quite ruined by the numbers of Aphids present.

SUBRAMANIAM (T. V.). **Some Natural Enemies of Mango Leaf-hoppers (*Idiocerus* spp.) in India.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 465–467, 2 plates.

The mango crop in India is attacked by the three Jassids, *Idiocerus niveosparsus*, *I. atkinsoni* and *I. clypealis*. Within the past three years, three natural enemies of the adult hoppers and one of the nymphs have been discovered, on which notes are recorded from observations made in the mango gardens of Bangalore.

The fly, *Pipunculus annulifemur*, Brun., described in a subsequent paper, parasitises all three species of hoppers, though *I. atkinsoni* is less frequently attacked than the other two. Oviposition has not been observed. Young and mature larvae have been found on their hosts during November and December. The parasitised hoppers are very sluggish. The mature larva emerges from between two segments of the abdomen, drops to the ground and pupates under the soil. The Stylopid, *Pyrilloxenos compactus*, Pierce, is found buried in the abdomen of either *I. atkinsoni* or *I. clypealis*. The mode of entry into living hoppers has not yet been observed. Generally only one parasite is found in one hopper, but two or three have been occasionally observed. *I. atkinsoni* is particularly heavily infested, up to 30 per cent. of parasitised individuals having been found, as compared with about 15 per cent. of *I. clypealis*. The adult parasites lived only eight or ten hours after emergence in captivity. The moth, *Epipyrops fuliginosa*, Tams, described in a subsequent paper, parasitises all three species of hoppers. Oviposition has not yet been observed, nor is it definitely known on what the larvae feed; the hoppers do not seem to suffer in any way from the presence of the parasites. Pupation takes place under the leaves of the mango, or on the stems, in a white tough silken cocoon, which is very conspicuous on the trees.

The grubs of an unidentified Dryinid have been found in a dark, sac-like covering attached to the thorax of the hopper nymphs during the mango blossoming season. All three species of hoppers are attacked, and none of the nymphs seem to survive.

Tams (W. H. T.). **Description of a New Species of *Epipyrops* from South India.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 468-469.

Epipyrops fuliginosa, sp. n., parasitising *Idiocerus* spp., is described from Bangalore.

Brunetti (E.). **A New Pipunculid parasitic on Leaf-hoppers in India.** —*Bull. Ent. Res., London*, xii, pt. 4, February 1922, p. 469.

Pipunculus annulifemur, sp. n., a parasite of *Idiocerus* spp., is described from Bangalore.

Bryant (G. E.). **Some New Injurious Phytophaga from Africa.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 473-475, 4 figs.

The new Phytophaga here described are *Crioceris viridissima*, from Kenya Colony, attacking asparagus; *Cercyonia citri*, from the Gold Coast, where it is a widely-distributed and serious pest of young citrus plants; and *Argopistes oleae* and *A. sexvittatus*, from Cape Province, mining the leaves of olive trees. As the last-named has stood in the British Museum collection since 1867 as *Pseudococcinella sexvittata*, Chevr. (MS.), it has been thought better to retain the specific name, which has probably been widely circulated.

Ramachandra Rao (Y.). **Notes on the Life-histories of Two Mesopotamian Moths.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 477-479.

The notes on *Ocnerogyia amanda*, Staud., given in this paper are intended to supplement the account of the moth given by Buxton [*R.A.E.*, A, viii, 500]. The eggs are laid in groups of 20 to 50 or

more, usually on the bark of the stem or on the lower surface of the leaves. The incubation period probably lasts from a week to ten days in summer. The larval stage, in two cases under observation, occupied about 24 days, the larvae passing through six moults and feeding at night, and hiding in crevices in the soil or bark during the day, or occasionally on the lower surface of the leaves. The pupal stage in the above two cases occupied 8 to 11 days; the entire life-cycle is therefore probably about 1½ months. There are probably three generations from April to September. It most probably hibernates as a larva in crevices of the soil or bark, but may pass the winter in the egg stage. Pupation occurs in a loose silken cocoon in cracks in the soil or mud walls. It is thought that banding the stems with tanglefoot might prove effective and economical in large gardens.

The Sphingid, *Theretra alecto*, L., is found on grape-vines in both spring and autumn, but not usually in large numbers.

DALMASSO (G.). **La Lotta contro le Tignuole dell' Uva.** [Work against the Vine-moths.]—*Casale Monferrato*, Tipografia Giuseppe Lavagno, 1922, 86 pp., 19 figs., 4 plates.

This booklet embodies the author's report to the National Congress of Vine Growers, held at Brescia in September 1921. The vine-moths concerned are *Clysia* (*Conchylis*) *ambiguella*, Hb., and *Polychrosis* (*Eudemis*) *botrana*, Schiff. The information regarding these pests, their life-history, and the measures that have been employed against them during the past ten years in Italy and elsewhere, are summarised.

The biological method of control is the subject of a special chapter.

The following conclusions are reached as regards practical work in Italy. Indicators, consisting of plates containing diluted molasses, should be placed in various parts of the vineyard in May, about four to an acre. About 8–10 days after the maximum number of moths has been noticed, a first spraying is required with Bordeaux mixture containing 1 per cent. of lead arsenate or 3 per cent. of a tobacco extract with a 5 per cent. content of nicotine. About 10 days later a second treatment, similar to the first, must be made. In July the indicators must be again brought into use, and 5–6 days after the maximum count, spraying must be done with the nicotine spray given above, and repeated 10 days later. In the first week in August the damaged grapes must be removed from the bunches, and in September rags or other shelter-traps must be fastened to the stocks. These must be collected either in April after the parasites have emerged or they may be collected earlier and stored in boxes with a gauze cover of 2 mm. mesh.

FEYTAUD (J.). **La Pratique des Traitements mixtes sur le Pommier et le Poirier.**—*Rev. Zool. Agric. & App., Bordeaux*, xx, nos. 9–10 and 11–12, September–October and November–December 1921, pp. 97–105 and 113–122.

The composition and practical value of certain combined sprays for apple and pear trees in France are discussed, and the results of many experiments are recorded. Tests have proved that arsenical treatments are very efficacious against *Cydia* (*Carpocapsa*) *pomonella*, and also against leaf-eating caterpillars. A further advantage is gained by substituting for the simple lead arsenate spray a mixture that

will also protect the crop from the fungi, *Venturia* spp. These mixtures are of two sorts, according to whether the anticryptogamic substance is a copper compound or a polysulphide. Among the copper-arsenical mixtures, Verdet lead arsenate is the most easily prepared, but is apt to produce serious scorching. The author places more confidence in Bordeaux arsenical sprays, which can be replaced by polysulphide mixtures for application on the forming fruit. In Bordeaux mixture, calcium arsenate is less expensive than lead arsenate but seems rather less effective. The author recommends for preference Bordeaux mixture made with 8 lb. copper sulphate with 40 lb. freshly-slaked lime (or 20 lb. fat lime) per 10 gals. of water, to which is added 5 lb. lead arsenate previously mixed with part of the water. An advantage will probably accrue in the future, in regard to the cost, by the substitution of polysulphides for copper. These unite readily with calcium arsenate, with the addition of a good quantity of lime. Alkaline polysulphides cannot be used with lead arsenate, but with lime-sulphur mixtures they form a very successful spray which causes but little scorching. It is not likely, however, that these lime-sulphur mixtures will readily become popular in France, owing to difficulties attending their manufacture and to the established custom of copper treatments.

Section d'Entomologie, Apiculture, Pisciculture et Sericiculture.—*Bull. Soc. Agric. France, Paris,* liv, no. 2, February 1922, pp. 48–49.

White grubs have been very injurious to beets, especially in the neighbourhood of Paris. Collection of the adult beetles has been successfully practised in certain localities, no other remedial measure practicable on large areas having yet been found. The root Aphid, *Trama troglodytes,* Heyd. (*Rhizobius radicis,* Koch), has been frequently observed on the roots of various salad crops. Much damage was done to cabbage by the weevil, *Ceuthorrhynchus assimilis,* Payk. The roots of cabbages should be pulled up and destroyed immediately the plants have been cut, as they contain many larvae. The same treatment should be applied to asparagus infested by the asparagus fly, *Platyparea poeciloptera,* Schr. It is reported that the parasites of the brown-tail moth, *Nygmia phaeorrhoea,* Don., have become so well established in some districts as to destroy the moth in great measure.

Marié (P.). **Application des Traitements Insecticides d'Hiver et Destruction des Cochenilles.**—*Bull. Soc. Agric. France, Paris,* liv, no. 2, February 1922, pp. 37–40, 4 figs.

Fruit trees in France, especially those in the smaller and more neglected orchards, are often severely attacked by Coccids. The importance of winter treatments with milk of lime or an alkaline wash is emphasised, formulae being given for suitable washes. When the bark is in good condition, one application towards the end of the winter should be sufficient, but if the bark is old and cracked it should be well scraped before the wash is applied; all the old debris of the bark should be collected in a cloth spread for the purpose, as it will contain many young scales or eggs.

Bestrijding van Plantenziekten in kleine Tuinen. II. [Measures against Pests of Plants in Small Gardens. II.]—*Verslag. & Meded. Plantenziektenk. Dienst, Wageningen*, no. 21, April 1921, 18 pp., 5 plates. [Received 25th February 1922.]

This second part of a popular manual [*R.A.E.*, A, ix, 476] deals with the fungous and insect enemies that occur from April to October in Holland.

CAMPANILE (R. F.). **L'Organizzazione della Lotta contro la Cocciniglia rossa degli Agrumi.** [The Organisation of Work against the Red Scale of *Citrus*.]—*Il Picentino, Salerno*, xi, no. 2, February 1922, pp. 25–26.

The red scale of citrus, *Chrysomphalus dictyospermi*, Morg., has appeared in the province of Salerno, where it has four generations a year.

BOGDANOV-KATKOV (N. N.). **Список Русской Литературы по Прикладной Энтомологии за 1917-1921 г.г.** [List of Russian Literature on Applied Entomology for 1917–1921.]—**Сельско-Хозяйственный Ученный Комитет. Отдел Прикладной Энтомологии.** [*Rur. Econ. Learned Committee*], *Petrograd*, 1921, 16 pp. [Received 28th February 1922.]

This is the first part of a list which is intended to comprise all the Russian literature published during 1917–1921 on applied entomology and which also includes publications on applied zoology. It is hoped that a second part will complete the list.

PUSHKAREV (N. I.). **Новый Способъ очистки Урожая Гороха отъ Сѣмянъ, пораженныхъ гороховой зерновкой** (*Bruchus pisi*), **посредствомъ концентрированныхъ Растворовъ Солей (Силитры и поваренной Соли).** [A New Method of cleansing the Pea Crop from Seeds infested with *Bruchus pisorum*, by means of concentrated Salt Solutions (Saltpetre and Common Salt).]—**Ростово-Нахичеванская на Дону Сельско-Хозяйственная Опытная Станція. Отдѣлъ Полеводственный.** [*Rostov-Nakhitchevan-on-the-Don Agric. Expt. Sta., Field Dept.*], *Rostov-on-Don*, Bull. 122, 1919, 25 pp. [Received 28th February 1922.]

It is almost impossible to obtain peas entirely free from the ravages of *Bruchus pisorum* (*pisi*) from fields that have been infested with this beetle, even when systematic remedial measures are employed. A method has, however, been devised by which the clean peas may be separated from the infested ones. After harvesting, they should be immersed in a concentrated salt solution, the specific gravity of which must be higher than that of the least seriously damaged peas, so that the latter will all rise to the surface. For the larger varieties of peas it is advisable to use Chile saltpetre, as a higher specific gravity may be thus obtained. The liquid may be utilised afterwards as manure. Care must be taken to wash and dry the peas thoroughly after they have been removed from the salt.

Bogdanov-Katkov (N. N.). **Энтомо-Фитопатологическая Жизнь на Юго-Востоке России.** [Entomo-Phytopathological Life in South-eastern Russia.]—**Бюллетень Постоянного Бюро Всероссийских Энтомо-Фитопатологических Съездов** [*Bull. Permanent All-Russian Ent. Phytopath. Meetings*], *Petrograd*, no. 4, 10th December 1921, pp. 1–23, 9 figs. [Received 28th February 1922.]

The chief centres of entomological activities in south-eastern Russia are Stavropol, Krasnodar (Ekaterinodar) and Novorossisk. Particulars are given of the personnel and staff attached to these centres and to the various Stations. A list is also given of the literature recently published and the projects now under way. One of the more important occurrences during 1920 was the appearance of locusts, *Locusta migratoria*, L., in the Kuban district. In the absence of insecticides and sprayers, mechanical measures had to be employed, such as driving the locusts into ditches. Experiments with poison gases were also undertaken and are to be continued.

Ahlberg (O.). **Zur Kenntnis der schwedischen Thysanoptera.** [A Contribution to the Knowledge of Swedish Thysanoptera.]—*Ark. Zool., Stockholm*, xiii, no. 17, 1921, pp. 1–10, 4 figs. [Received 28th February 1922.]

Among the thrips not previously recorded from Sweden are *Rhipidothrips niveipennis*, Reut.; *Cryptothrips latus*, Uzel, from meadow grass; and *Trichothrips copiosus*, Uzel, from beneath the bark of limes.

La Aplicación de Colonias de *Novius cardinalis*. [The Establishment of Colonies of *N. cardinalis*.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo*, i, no. 3, March 1920, p. 50, 1 map. [Received 28th February 1922.]

This is a note on the dissemination in Uruguay of *Novius cardinalis*, imported from Europe against *Icerya purchasi* [*R. A.E.*, A, x, 93].

Schunk (L.). **El Taladro de los Plátanos.** [The Plane Tree Borer.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo*, i, no. 3, March 1920, pp. 54–55. [Received 28th February 1922.]

Various Bostrychid and Longicorn beetles infest fruit and forest trees in Uruguay. Injury by such borers is very serious in the case of plane trees. The trunks of young trees suffer most injury, but in older ones the chief damage is done to the branches. Measures that have been adopted with entire success in the case of plane trees grown for street shading include the removal of half the larger branches, the cut surfaces being covered with Norwegian tar after a few drops of carbon bisulphide have been poured into any mines found. Damaged portions of the trunks are cut out, and any mines plugged with rags soaked in naphtha; after two or three days the cavities are filled with a mixture of cow dung 50 parts by weight, ashes 35, sand 3, and plaster 25.

Como terminó la *Prospaltella berlesei* **con el** *Diaspis pentagona.* [How *P. berlesei* eradicated *D. pentagona.*]—*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 3, March 1920, pp. 55–58, 12 figs. [Received 28th February 1922.]

This is a popular account of the parasitism of *Diaspis pentagona* by *Prospaltella berlesei.*

El Pulgón del Manzano, *Schizoneura lanigera.* [The Apple Aphis, *Eriosoma lanigerum.*]—*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 4, April 1920, pp. 97–98, 1 fig. [Received 28th February 1922.]

Autumn and winter measures against *Eriosoma lanigerum,* Hausm., include the application of tobacco dust to the uncovered roots. Rain will then bring the nicotine into contact with the Aphids and prevent re-infestation in the following year. The trunk and branches should be washed with a 4 per cent. solution of potash soap or a 5 per cent. solution of " Rubina," which is an official preparation of vegetable tar and solvent and poisonous ingredients.

La Lucha contra la Langosta ; Convenio entre el Brasil y el Uruguay. [Anti-locust Work ; a Convention between Brazil and Uruguay.] —*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 7, July 1920, pp. 59–60. [Received 28th February 1922.]

By a convention dated 7th May 1920, the Brazilian and Uruguayan governments agreed to an exchange of information relating to locusts in their territories and to the free passage of staff and apparatus across their common frontier whenever necessary.

Brèthes (J.). **El Bicho de Cesto ; como vive, se multiplica y difunde.** [The Bag-worm ; its Habits, Increase and Spread.]—*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 7, July 1920, pp. 167–174, 8 figs. [Received 28th February 1922.]

The bag-worm, *Oeceticus platensis,* Berg, is a well-known and important pest of trees in many provinces of Argentina and in those of Uruguay with a similar climate. *Eucalyptus* and a very few other trees are the only ones immune from infestation.

La Lucha contra el Pulgón del Manzano. [Work against the Apple Aphis.]—*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 9, September 1920, pp. 207–208. [Received 28th February 1922.]

This note records the measures taken with a view to importing *Aphelinus mali,* Hald., a parasite of *Eriosoma lanigerum,* Hausm., which is a dangerous pest of fruit trees in Uruguay.

La Oruga de los Coles, *Pieris brassicae.* [The Cabbage Butterfly.]—*Uruguay*: *Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo,* i, no. 9, September 1920, pp. 223–224, 1 fig. [Received 28th February 1922.]

The remedies advocated against *Pieris brassicae,* L., are dusting with lime, watering with warm water at 45° C. [113° F.], or spraying with a 2½ per cent. solution of soap or with an emulsion containing 10 parts of carbon bisulphide in 100 of water.

PELUFFO (A. T.). **El Pulgón negro del Duraznero,** *Aphis persicae.* [The Black Aphis of the Peach.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* i, no. 9, September 1920, pp. 225–227, 1 fig. [Received 28th February 1922.]

The winter eggs of *Myzus persicae* hatch in spring, and the resulting apterous females reproduce parthenogenetically. There are a number of apterous and alate generations during the spring and summer. Among the more important natural enemies is a Coccinellid, *Cycloneda* (*Neda*) *sanguinea.* A potash soap spray is recommended, care being taken to apply this in fine weather in the evening, as spraying in hot sunshine may result in scorching.

La Lagarta de la Alfalfa. [The Lucerne Butterfly.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* i, no. 9, September 1920, pp. 231–233, 7 figs. [Received 28th February 1922.]

These notes briefly describe the lucerne butterfly [*Colias lesbia*], the damage done by it, and the measures suitable against it.

GIACCONE (V.). **Los principales Enemigos del Naranjo y Arboles famigliares.** [The Chief Enemies of the Orange and Cultivated Trees.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* i, no. 9, September 1920, pp. 234–235, 2 figs. [Received 28th February 1922.]

The pests mentioned are two scales, *Pseudococcus* (*Dactylopius*) *citri*, Risso, and *Aspidiotus hederae*, Vall. (*limonii*, Sign.), against which the usual measures are advised.

PELUFFO (A. T.). **El "Gusano" de las Manzanas,** *Carpocapsa pomonella.* [The Apple Worm, *Cydia pomonella.*]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* i, no. 10, October 1920, pp. 255–260, 8 figs. [Received 28th February 1922.]

About 90 per cent. of the Uruguayan apple crop is damaged by *Cydia* (*Carpocapsa*) *pomonella*, L.; this article describes the various traps and sprays that should be used to decrease this loss.

MOLINS (J.). **El Bicho moro o Vaquilla:** *Epicauta adspersa—Epicauta atomaria.* [The Black Grub, *E. adspersa—E. atomaria.*]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* i, no. 12, December 1920, pp. 325–328, 4 figs. [Received 28th February 1922.]

The larvae of *Epicauta adspersa* hatch after an incubation period of three weeks. It is believed that locust eggs form their chief food, and they have been seen to devour eagerly the eggs of *Dichroplus vittiger.* An increase of these beetles also appears to take place after a locust outbreak. Hibernation occurs in a pseudo-pupal stage, which may last for years. The adult is responsible for injury to Solanaceae, beet, lucerne and other plants. The best checks are spraying with copper arsenate, Paris green, etc. A 4 per cent. solution of potash soap is also useful.

PELUFFO (A. T.). **Informe de la Inspección realizada a varios Departamentos del Interior con Motivo de la Aparición de una nueva Cochinilla en los Naranjos.** [Report of a Tour of Inspection in the Interior, due to the Appearance of a new Coccid on Orange Trees.]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo*, ii, no. 1, January 1921, pp. 2-5, 2 figs. [Received 28th February 1922.]

Saissetia (*Lecanium*) *oleae*, *Lepidosaphes beckii* (*Mytilaspis citricola*), *Chrysomphalus aonidum* and *Icerya purchasi* were among the scales observed on orange in the course of these investigations.

PELUFFO (A. T.). **Sobre el Parásito de los Pinares.** [On the Pest infesting Pine Forests.]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo*, ii, no. 1, January 1921, pp. 10-11. [Received 28th February 1922.]

In the Maldonado district many pines have been killed by *Pissodes notatus*, and the infestation threatens to spread unless energetic measures are taken without delay.

El Enemigo del Pulgón del Manzano. Trabajos para su Aclimatación. [The Enemy of the Apple Aphis. Acclimatisation Work.]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo*, ii, no. 2, February 1921, pp. 39-41, 2 figs. [Received 28th February 1922.]

All the specimens of *Eriosoma lanigerum*, Hausm., imported from the United States were dead on arrival, but from this material some living Hymenopterous parasites, believed to be *Aphelinus mali*, Hald., have been obtained.

SUNDBERG (R.) & PELUFFO (A. T.). **La Importación del *Aphelinus mali* al Uruguay para combatir el Pulgón del Manzano y algunas Observaciones realizadas sobre la Vida del Insecto auxiliar.** [The Importation of *A. mali* into Uruguay to combat the Apple Aphis, and some Observations on the Life-history of this Insect Auxiliary.] —*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens., Montevideo*, ii, no. 3, March 1921, pp. 65-81, 14 figs. [Received 28th February 1922.]

The negotiations and work which resulted in the introduction of *Aphelinus mali* into Uruguay from the United States are recorded. This enemy of *Eriosoma lanigerum*, Hausm., appears to have established itself, its spread being only a question of time. The success of the importation seems to have been due to the low temperature (36° F.) in the storage chamber of the steamer. This permitted some of the parasites to reach Montevideo alive as pupae within the host Aphids. The season was favourable, as the boat left New York on 11th December 1920 and reached Montevideo on 13th January 1921.

Some observations were made in the laboratory. The colour of an infested Aphid gradually changes from the usual reddish chestnut until it becomes black a few days before the Chalcid emerges. In captivity specimens that emerged on 4th March and were placed on apple twigs infested with *E. lanigerum*, died in two or three days. Specimens placed in a Petri dish with a 25 per cent. solution of honey

in water lived for twelve days. These experiments with syrup were prompted by an observation of an adult Chalcid apparently sucking the secretion from the pores of *E. lanigerum*. Various other points of interest are being studied and will be reported on.

GIRARDI (J.). **En el Nogal. Nuevas Enfermedades de las Hojas y de las Frutas.** [In the Walnut Plantation. New Injuries of the Leaves and Fruits.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* ii, no. 4, April 1921, pp. 111–112. [Received 28th February 1922.]

A new pest of the walnut in Uruguay is *Eriophyes* (*Phytoptus*) *vitis*, on the lower surface of the leaves. This mite may be combated by spraying with a 1 per cent. solution of calcium or potassium polysulphide. Another enemy, which infests the nuts, is the well-known apple pest [*Cydia pomonella*].

GIACCONE (V.). **Culebrilla y Arañitas.** [*Julus* and *Tetranychus*.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* ii, no. 4, April 1921, pp. 114–115, 1 fig. [Received 28th February 1922.]

Much damage is done by *Julus* sp. to potato tubers, bulbs in general, and young leguminous, cucurbitaceous and solanaceous plants. Cereals and fruits are also attacked by this millipede. Traps of melon rinds, lettuce leaves, etc., appear to be the only means at present used against this pest. When preparing ground for vegetables, etc., carbon bisulphide should be injected at the rate of 4–10 cc. per square metre. A preliminary watering with soapy water drives the millipedes away, but in this case the surface of the soil must be scraped off before planting. Vegetable ashes should be placed at the bottom of each furrow. Against *Tetranychus* a 3 per cent. solution of soap or a solution of tobacco extract will give good results.

El *Pissodes notatus*, **declarado Plaga de la Agricultura.** [*P. notatus* declared a Pest of Agriculture.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* ii, no. 5, May 1921, p. 121. [Received 28th February 1922.]

On 29th April 1921 a decree of the Ministry of Industries declared *Pissodes notatus*, F., to be an agricultural pest.

Le Difusión del *Aphelinus mali*. [The Distribution of *A. mali*.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens., Montevideo,* ii, no. 5, May 1921, p. 121. [Received 28th February 1922.]

From 9th March to 14th May 1921 the Defensa Agrícola supplied 46 enquirers with colonies of *Eriosoma lanigerum*, Hausm., parasitised by *Aphelinus mali*. Every indication points to a satisfactory establishment of this parasite.

Ordinance No. 26 of 1920 to Consolidate the Law relating to Plant Diseases and Pests.—*British Guiana*, 23rd October 1920. [Received 1st March 1922.]

Under this Order the Board of Agriculture may prohibit or restrict the importation from any place of any seeds, plants, etc. that are

likely to be a means of introducing any plant disease or pest. The latter include the giant moth borer [*Castnia licus*], mealy-bug [*Pseudococcus*], wood ants, beetles, locusts, froghoppers [*Tomaspis*], cane-fly on sugar-cane [*Stenocranus saccharivorus*], and various other pests, as well as any to which this Ordinance shall be made to apply by Order of the Board of Agriculture. Any articles arriving from a place from which importation is prohibited or restricted shall be deemed prohibited goods within the meaning of the Customs Ordinance, 1884. The powers of the Board of Agriculture as regards inspectors, the declaration and treatment of infected areas, penalties in cases of neglect or refusal to carry out orders, and the compensation that may be granted for the removal or destruction of crops, trees or bushes are defined.

An Act to provide for the Eradication of the Mosaic Disease of any Sugar-cane or Grasses, 1921-39.—*Barbados*; 12th November 1921, 3 pp. [Received 5th April 1922.]

Under the above Act, dated 12th November 1921, mosaic disease of any sugar-cane, grass or other plant is notifiable in Barbados. The powers of the Commissioners appointed to administer this Act, their right of entry to search for the disease, and orders for its eradication, together with the various offences, penalties and exemptions are defined.

[**Quarantine Measures in the French Colonies against** *Stephanoderes hampei*.]—*Journal Officiel* [*Paris*], 19th March 1922.

In view of the damage caused in Java, Sumatra and Uganda by the Scolytid coffee-borer, *Stephanoderes hampei* (*coffeae*), and of the possibility of its introduction into the French Colonies, a decree has been passed, dated 27th February 1922, prohibiting, in French Colonies that are free from this beetle, the importation, circulation, storage or transit of any product likely to propagate the insect, originating from any country where the presence of the borer has already been recorded, or where the importation of such products is not prohibited or controlled. The prohibition applies to coffee plants or any part of them; to coffee beans, either fresh or dried, either in the capsule or husked, and includes any soil or manure with the plants, and any bags, boxes or packing that have been used for their transport. Any other plants or parts of plants likely to harbour *S. hampei*, notably *Hibiscus* spp. and *Rubus* spp., are likewise prohibited. Consignments of the above-mentioned materials originating from countries not included in this quarantine must be accompanied by a certificate of their origin, duly viséd, otherwise they are liable to be destroyed by fire. Certificates of entry can only be granted at specified ports of each Colony and by the local administration. The countries for which certificates can be granted include Indo-China, Madagascar, New Caledonia, Guadeloupe, Martinique, Guiana and French West Africa. The quarantine imposed includes the produce of the Dutch Indies, the English Antilles, Réunion and French [? British] Equatorial Africa, and all countries where such produce is not prohibited nor subject to any phytopathological control. Further countries may be brought under this quarantine order as necessity arises. Penalties for infringement of this order have been fixed on the lines of a previous decree.

SANDERS (G. E.). **Spraying and Dusting in Annapolis Valley.**—*Canad. Hortic., Toronto, Ont.*, xlv, no. 2, February 1922, pp. 21–22.

On account of the extreme dry weather, lack of dew and windy mornings, spraying gave better results, in comparison with dusting, during 1921 than in a normal year. For the same reasons sulphur-lead-arsenate dust gave better results in 1921 than in any previous year in which it had been compared with copper-arsenic dust. The low cost of the latter in 1921 resulted in a saving to Nova Scotia growers of approximately £10,000, as compared with liquid spray. A new formula for dusting made from lump lime of hydrated crystal copper sulphate, instead of dehydrated, and white arsenic in place of calcium arsenate was tested. It keeps perfectly over a longer period as a dust, and is less expensive.

Experiments were made with a poisoned Bordeaux mixture made according to the white arsenic formula recommended for use on potatoes. A 2-lb. package of white arsenic-hydrated lime mixture (known as D.E.L. mixture) should be stirred into 10 gals. water. A bag containing 10 lb. coarse copper-sulphate crystals should be suspended in the water and stirred until the crystals dissolve. This formula gave excellent results on apple when enough lime was added to give a 3–10–40 mixture. The great advantage of this mixture is the cost, the white arsenic costing one-tenth as much as lead arsenate and one-fifth as much as calcium arsenate.

The results of testing spray calendars side by side for a number of years are given. In no case did the trees sprayed with lime-sulphur give one-half as many apples as those sprayed with Bordeaux.

MCLENNAN (A. H.). **Three Market Garden Troubles.**—*Canad. Hortic., Toronto, Ont.*, xlv, no. 2, February 1922, p. 23, 1 fig.

The two chief insect pests of market gardens are the cabbage root maggot [*Phorbia brassicae*], and the tarnished plant bug [*Lygus pratensis*]. A solution of 1 oz. corrosive sublimate in 10 gals. water applied the fourth day after planting and twice afterwards, at intervals of a week, has proved the most economical measure. Under some conditions 1 oz. to 6¼ gals. water has proved effective with one application, but should not be used unless its use is thoroughly understood. A bait of 1 oz. sodium arsenate, mixed with 1 gal. water and ½ gal. molasses, and placed in saucers 30 feet apart each way as soon as the plants appear above the ground, is satisfactory for flies related to *P. brassicae* on cabbages and onions.

During 1921 a combination that proved effective in controlling celery blight, and also *L. pratensis* on celery, was 20 lb. Bordeaux dust, 20 lb. sulphur, 30 lb. lime and 30 lb. tobacco dust.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Lucia, 1920, Barbados*, 1921, p. 3. [Received 1st March 1922.]

Bananas were infested with banana weevil borer [*Cosmopolites sordidus*], which may be controlled by destroying all infested and unhealthy plants and maintaining clean cultivation. Regulations prohibiting the importation of sugar-cane cuttings, rice, maize or grasses from Porto Rico to protect St. Lucia against the introduction of mosaic diseases have already been noticed [*R.A.E.*, A, x, 130].

GOODEY (T.). **On the Susceptibility of Clover and some other Legumes to Stem-disease caused by the Eelworm,** *Tylenchus dipsaci,* **syn.** *devastatrix,* **Kühn.**—*Jl. Agric. Sci., Cambridge,* xii, pt. 1, January 1922, pp. 20–30, 1 plate.

This is a preliminary note on the results obtained from an attempt to procure a numerical expression of susceptibility of clover and other plants to stem disease caused by the Nematode, *Tylenchus dipsaci,* Kühn. A comparison is drawn between this disease and stem rot caused by the fungus, *Sclerotinia foliorum.*

The technique employed is described, and the results are given in detail in the form of tables. Examination of the figures shows that all the varieties of red clover tested are very susceptible to attack and fall into a common group to which cow-grass and kidney vetch also belong. Except for one or two details the results in general agree with those of Amos [*R.A.E.*, A, vii, 441]. The author found that seedlings of sainfoin are very slightly susceptible, whereas Amos never found this plant attacked. To avoid this pest, trefoil, lucerne, sainfoin or large white clover should be sown in place of red clover, cow-grass, alsike clover and kidney vetch.

ALDABA (V. C.). **The Pollination of Coconut.**—*Philippine Agric., Los Baños, Laguna,* x, no. 5, December 1921, pp. 195–207, 1 plate. [Received 1st March 1922.]

The insects observed on the flowers of coconuts and thought to be active agents in pollination were the Diptera, *Musca domestica,* L., and several species of *Lucilia,* and the Hymenoptera, *Vespa luctuosa,* Sauss., *Rhynchium atrum,* Sauss., *Apis indica,* F., and *Trigona biroi,* Fr.

DESBORDES (H.). **Description de deux Histérides nouveaux de l'Inde (Col.).**—*Bull. Soc. Ent. France, Paris,* 1922, no. 1, 11th January 1922, pp. 7–9.

The new Histerids from India here described are *Platysoma (Platylister) buteanum,* from Saharanpur, United Provinces, taken on *Butea frondosa* (apparently under the bark), and *Trypeticus beesoni,* taken in Assam in the trunk of an unidentified tree.

PICARD (F.). **Notes biologiques sur quelques Hyménoptères.**—*Bull. Soc. Ent. France, Paris,* 1922, no. 2, 25th January 1922, pp. 27–30.

Saperda populnea, reared in galls at Montpellier, was found to have many parasites, but the most unexpected was *Apanteles hoplites,* obtained in several instances. No species of *Apanteles* has previously been recorded as parasitic on Cerambycids. *A. hoplites* has been reported in Germany from larvae of *Rhynchites betuleti* and *Melasoma (Lina) tremulae,* and has been observed in England as a parasite of *Gelechia pinguinella,* all of these being pests of poplar.

POUTIERS (R.). **Note sur la Présence en Tunisie de** *Phthorimaea operculella,* **Zell. (Lep. Gelechiidae).**—*Bull. Soc. Ent. France, Paris,* 1922, no. 2, 25th January 1922, pp. 30–31.

The fact that *Phthorimaea operculella,* Z., has been recorded from Algeria, and more recently from Morocco, indicated that it might be expected to occur also in Tunisia. It has in fact been found, but only

at Sousse, in October 1921, where it had only been introduced a few weeks previously. Enquiry elicited the fact that it had been imported with a consignment of potatoes from Malta. Every effort is being made to arrest its spread from the infested district.

FAES (H.). **La Culture indigène du Pyrèthre** (*Pyrethrum cinerariaefolium*).—*Ann. Agric. Suisse, Lucerne*, xxii, no. 6, 1921, pp. 433–438, 3 figs. [Received 2nd March 1922.]

Pyrethrum powder is obtained from three species of *Chrysanthemum* (*Pyrethrum*), namely, *C. cinerariaefolium*, *C. roseum* and *C. carneum*, the first-named furnishing the bulk of the powder used in commerce. This species grows wild in Montenegro, Dalmatia, Herzegovina and Istria, and has recently been cultivated in certain parts of France. The general methods of cultivation are discussed. As a result of much experiment, it has been found that the best method of using the powder against the vine moths, *Clysia ambiguella* and *Polychrosis botrana*, is by extracting the active principles by means of alcohol or organic chlorides, and then combining the extract with a concentrated soap solution. The advantages of this insecticide over nicotine sprays are pointed out, one of the chief being that treatment can successfully be given over a much longer period (for about a fortnight against the young larvae of the first generation). The production of pyrethrum in France is increasing greatly, and there is a certain sale for further supplies.

FAES (H.). **La Lutte contre le Ver de la Vigne** (*Cochylis*) **en 1921 et la Solution de Savon-Pyrèthre.**—*La Terre Vaudoise, Lausanne*, xiv, no. 7, 18th February 1922, pp. 88–90.

A number of instances are given of treatments of vines with pyrethrum-soap solution, and very satisfactory results are recorded for each.

HOWARD (L. O.). **(A) On some Presidential Addresses ; (B) The War against the Insects.**—*Science, Garrison-on-Hudson, N.Y.*, liv, no. 1409, 30th December 1921, pp. 641–651.

The author emphasises the fact that man, being the dominant type on this earth, has overcome most opposing animate forces with the exception of the bacteria and protozoa that carry disease and the myriads of injurious insects that are his greatest rivals in the control of nature. Though the power of insects is often ignored, to a certain extent on account of their small size, it is evident that they are in many ways better fitted for existence on this planet than man, and they must be overcome by him if he is to retain his supremacy. The control of such a large group necessarily demands the services of a great number of trained biologists, and with this end in view it is suggested that all the departments of biology in all the universities shall begin a concerted movement to prepare men for this defensive and offensive campaign.

METCALF (Z. P.). **The Age of Insects.**—*Jl. Elisha Mitchell Sci. Soc. Chapel Hill, N.C.*, xxxvii, no. 1 & 2, December 1921, pp. 19–53.

A general account of insects is given, including their physiology, psychology, general life-history and ecological relations. Although

much has been done in the past in the study of insects and various phases of their control, many points still require elucidation, and attention is drawn to the wide field thus offered to future students.

Rawes (A. N.) & Wilson (G. F.). **Pollination in Orchards.**—*Jl. R. Hortic. Soc., London,* xlvii, pt. 1, January 1922, pp. 15–17.

Observations begun in 1912 at Wisley indicate that wind plays no part in the pollination of fruits, and that several other insects beside hive bees are very active agents. In addition to hive bees, insects pollinating apple blossom are bumble bees, *Bombus lapidarius, B. terrestris, B. lucorum, B. muscorum* and *B. helferanus*, though the two last are comparatively rare. *Andrena* sp. and other allied genera are numerous and active, while *Eristalis* sp., *Syrphus* sp., midges and other small Diptera are also abundant. The breeding-places of all these insects may be found near most gardens and orchards. The observations are less conclusive as to the effective work of such insects in carrying pear and plum pollen. The most frequent visitors to these trees are hive bees, bumble bees and Diptera. Bumble bees on pears and midges on plums are uncommon.

Jarvis (E.). **Cane-beetle Control.**—*Queensland Agric. Jl., Brisbane,* xvii, pt. 1, January 1922, pp. 36–39, 1 plate.

As a result of showery weather between the 26th and 31st October 1921, grey-back beetles emerged freely from volcanic and other soils around Gordonvale. The native food-plants found to be mostly affected were the Moreton Bay ash (*Eucalyptus tessellaris*) and *Ficus opposita*, though the latter was seldom attacked unless far removed from other food-plants. The importance of collecting beetles from trees close to headlands during the three weeks following emergence, before egg-laying commences, is emphasised. Some observations on the reaction of *Lepidiota albohirta* to artificial light are recorded.

Experiments are described of fumigating eggs with carbon bisulphide. When the eggs were covered with 130 to 280 cu. in. of soil and fumigated at distances varying from 4½ to 8 in. with a dose of ⅛ oz., they were killed within a few hours.

Some specimens of *Apanteles nonagriae*, Ol., a parasite of *Phragmatiphila truncata*, Wlk., have been obtained and are being bred for distribution in districts where this moth is proving troublesome.

Froggatt (J. L.). **The Banana Beetle Borer,** *Cosmopolites sordida*, **Chev. (Curculionidae). (Second Progress Report.)**—*Queensland Agric. Jl., Brisbane,* xvii, pt. 1, January 1922, pp. 39–45, 2 figs., 2 tables.

The investigations here recorded on *Cosmopolites sordidus* (banana beetle borer) were carried out from July to December 1921.

Both field and laboratory observations show that oviposition has been continuous throughout the year. A table is given showing the total number of eggs laid in each month by captive beetles. There is a considerable fall in the production with the cold weather, but it does not cease completely. The longest period passed in the egg stage was in the case of eggs laid between 25th and 27th July 1921, these maturing in 35–37 days. It was found that from larvae emerging in June and early in July about 130 days were passed in the larval and

pupal stages, while larvae emerging in October passed less than half this time in the two stages; through November these periods were still further reduced. Pupae collected in June matured in a minimum of 20 to 28 days; in September this period was reduced to a minimum of 10 to 14 days. From this it may be assumed that the larval periods during the same time were at least 60 to 80 days and 30 to 40 days, respectively. The average full life-cycle from eggs laid in June was 120 days; in September, 62–63 days; in October, 48–59 days; and in November, 31–33 days (one observation only). During the winter months the rate of mortality amongst newly emerged adults was very high.

A predacious beetle (*Plaesius javanus*) has been obtained from Java and liberated, but as the life-cycle of this Histerid is long, no conclusions can be arrived at for some time. No indigenous parasites have been found other than those mentioned in the first Report [*R.A.E.*, A, ix, 616]. Further observations have failed to show any difference in the relative frequency of attack or relative degree of damage to different varieties of banana plants by *C. sordidus*, neither have they shown that the presence of disease in a plant influences the selection of the site for oviposition.

The best baits with the corms are obtained by splitting the corm so as to include a small portion of the base of the stem, as these present a moister surface for a longer time than those composed of the heart of the corm. Experiments have been undertaken with poisoned baits, but no conclusions are yet available. The weevil should be prevented from breeding by the destruction of breeding-grounds and harbourage, and all beetles should be trapped as soon after emergence as possible.

Bogdanov-Katkov (N. N.). **Капустная Тля и Меры Борьбы с Ней.** [Cabbage Aphis and its Control.]—**Всероссийский Союз Сельско-Хозяйственной Кооперации ("Сельскосоюз").** [*All Russian Union of Rural-Economic Co-operation*], *Petersburg*, 1922, 20 pp., 14 figs., 1 plate. [Received 14th March 1922.]

During 1919–21 the cabbage aphis, *Brevicoryne* (*Aphis*) *brassicae*, L., became one of the chief pests of Cruciferous plants in Russia. Its life-history and remedial measures for it are described [*R.A.E.*, A, ix, 552]. In addition to those already mentioned, instructions are also given for the preparation of quassia sprays.

Coelho de Souza (W. D.). **Serviço de Expurgo pelo Processo de "Ar Quente."** [Disinfestation [of Cotton Seed] by the "Hot Air" Process.]—*Bol. Minist. Agric., Ind. & Comm., Rio de Janeiro*, x, no. 1, January–February 1921, pp. 27–44, 3 plates. [Received 4th March 1922.]

This report describes a hot air machine for disinfecting cotton seed infested with the pink bollworm, *Platyedra* (*Gelechia*) *gossypiella*, Saund. The essential part of the apparatus consists of five discs placed one above the other and rotated by a vertical shaft passing through them. The seed passes from a hopper to the uppermost disc, where it is spread out and then delivered to the one beneath. This and the three lower ones, to which the seed passes in succession, are fitted with rollers that ensure a thin, even layer. Suitable mechanism causes the seed to fall at the periphery of some discs and

at the centre of others. After leaving the lowest disc the seed is conveyed out of the vertical, cylindrical hot air chamber, enclosing these working parts. A temperature between 53° and 56° C. [127·4° and 132·8° F.] is the best for disinfection, but results in decreasing the germinating capacity of the seed by about 15 per cent. This decrease is, however, of little importance in view of advantages gained by the destruction of the pest. Another type of this apparatus works with steam instead of hot air. It is suitable for desiccating vegetables and grain, and should be of use in cases of infestation of such products by weevils.

Carbon bisulphide has proved ineffective against *P. gossypiella*. The larvae survive fumigation for 48 hours with the usual commercial grade, and it is difficult to obtain the chemical in a pure form.

BONDAR (G.). **Planta tanifera**—*Acacia decurrens* **no Brasil.** [A tanniferous Plant, *A. decurrens*, in Brazil.]—*Bol. Minist. Agric., Ind. & Comm., Rio de Janeiro*, x, no. 1, January–February 1921, pp. 95–99, 5 plates. [Received 4th March 1922.]

Acacia decurrens var. *mollissima*, which has been introduced into Brazil from Australia, is attacked there by the Cerambycid beetles, *Criodion tomentosum*, Serv., *Coccoderus novempunctus*, Germ., and *Oncideres impluviata*, Germ.

The presence of *C. tomentosum* is revealed by swellings, which develop into wounds that exude gum. The adults occur from November to March and oviposit in the bark of the trunk and large branches. The larvae penetrate into the wood and bore upwards in the trunk. The mine may be 19 in. long. The larval stage lasts two years, pupation taking place at the upper end of the gallery. Infestation is easily preventible by clean cultivation, but once the trees are attacked they should be cut down and burnt.

The female of *Coccoderus novempunctus* oviposits in the smaller branches, and from these the larva bores into the larger ones and the trunk. When mature, it makes a spiral mine round the branch or trunk near the bark, and the portion above this cut falls to the ground with the larva, which then pupates near the bark. Branches up to six inches in diameter may be cut off in this manner. Some native Leguminosae are also attacked. Development requires two years. The fallen branches should be collected and the larvae within them killed.

The larva of *Oncideres impluviata* lives in recently dead wood, and to obtain such material the female cuts off the branches and stems of various Leguminous plants from one-fifth to one inch in diameter, and then oviposits in the amputated portions. The larval stage lasts from seven to eight months, and the adult emerges from the rotten wood and renews the attack from December to mid-February. This beetle is comparatively rare, but in one case all the trees of *A. decurrens* in a plantation were destroyed. The pest can be got rid of by collecting and destroying the fallen branches from April to July.

MORSTATT (H.). **Die Bekämpfung des roten Kapselwurms der Baumwolle.** [The Control of the Pink Bollworm of Cotton.]—*Der Tropenpflanzer, Berlin*, xxv, no. 1–2, January–February 1922, pp. 22–25.

The rapidity with which *Platyedra* (*Gelechia*) *gossypiella*, Saund., has become one of the most important pests of cotton is reviewed, and

its recent spread into Egypt, Brazil and Mexico and on the United States border is described.

In East Africa the German Government had only one method of dealing with the pest. The Cotton Ordinance of 30th July 1910 required complete clearing of the fields after harvesting and the burning of all parts of the cotton plants above ground. No measures were taken as regards the collection of infested bolls or the disinfection of seed.

Most of the information given relating to remedial measures is taken from the reports and papers on work done in Egypt in recent years [*R.A.E.*, A, vi, 42; ix, 316; etc.].

BERGEVIN (E.) & ZANON (V.). **Danni alla Vite in Cirenaica e Tripolitania dovuti ad un nuovo Omottero** (*Chlorita lybica*, **sp. n.**). [Injuries to the Grape-vine in Cyrenaica and Tripoli due to a new Homopteron, *C. lybica*.]—*L'Agric. Colon., Florence*, xvi, no. 2, February 1922, pp. 58–64, 4 figs.

A diseased condition of the foliage of vines, first noticed in July 1918 at Bengasi, is now believed to be due to infestation by a Jassid, here described by E. de Bergevin as a new species, *Chlorita lybica*.

A thrips, *Dictyothrips zanonianus*, found on the vine at Bengasi in 1917, has been recorded by Del Guercio.

PAGLIANO (T.). **Lepidottero nocivo ai Cavoli in Tunisia.** [A Lepidopterous Pest of Cabbages in Tunisia.]—*Bull. Soc. d'Hortic. Tun., Tunis*, xix, 1921, pp. 187–188. (Abstract in *L'Agric. Colon., Florence*, xvi, no. 2, February 1922, pp. 74–75.)

During 1921 Cruciferous plants in general and cabbages in particular were injured by a Lepidopteron. The adults oviposit on the basal leaves and the larvae bore superficially into the stem, the tissues being thus exposed to other insects, fungi and bacteria, so that the plant ultimately rots.

TOTHILL (J. D.). **A Revision of the Nearctic Species of the Tachinid Genus** *Ernestia* **R.D. (Diptera).**—*Canad. Ent., Guelph*, liii, no. 10, October 1921, pp. 226–230. [Received 7th March 1922.]

The species dealt with include *Ernestia johnsoni*, sp. n., the male of which is described from Massachusetts. It has been bred from *Hyphantria cunea*, Drury, but should not be confused with *E. ampelus*, Wlk., which is a major parasite of *Hyphantria*.

FLETCHER (T. B.) & INGLIS (C. M.). **Some Common Indian Birds. No. 13. The Indian House-sparrow** (*Passer domesticus indicus*).—*Agric. Jl. India, Calcutta*, xvii, pt. 1, January 1922, pp. 3–6, 1 plate.

The Indian house-sparrow (*Passer domesticus indicus*) appears to be a pest wherever it occurs. The young nestlings are fed largely on insects, chiefly caterpillars, but by the time they are about three weeks old their diet is made up almost entirely of grain. The nestlings are attacked by the blood-sucking larvae of a fly, *Passeromyia heterochaeta*.

Kulkarni (G. S.). **The "Murda" Disease of Chilli** (*Capsicum*).—*Agric. Jl. India, Calcutta,* xvii, pt. 1, January 1922, pp. 51–54, 2 plates.

Experiments have proved the "Murda" disease of chilli (*Capsicum*) to be produced by the same mite that causes the "Tambera" disease of potatoes [*R. A.E.*, A, viii, 409]. One spraying with lime-sulphur wash is sufficient to control it on chillies, provided that the spraying is done as soon as it appears. Besides the food-plants mentioned [*loc. cit.*], the mite also occurs on *Zinnia, Dahlia, Tagetes, Mirabilis jalapa*, Cape gooseberry, *Amarantus polygonus* and *Physalis minima*.

The identity of the mite causing these diseases has not yet been established, but it is thought to be a Tarsonemid.

Urich (F. W.). **Entomologist's Reports for 1919 & 1920.**—*Rept. Dept. Agric. Trinidad & Tobago for 1919 & 1920, Port-of-Spain*, 1921, pp. 14–24. [Received 8th March 1922.]

The short dry season of 1919 so equalised the distribution of natural enemies and their hosts that the usual pests were not serious, and sugar-cane pests were the only troublesome ones in 1920.

Cacao pests in 1919 included *Heliothrips* (*Selenothrips*) *rubrocinctus* (cacao thrips), which was not serious, and *Stirastoma depressum* (cacao beetle), which only attacks exposed and wind-swept fields in the northern districts of Trinidad, but is widely distributed in the south. A campaign was undertaken against this beetle in the Moruga district, and lead arsenate for spraying was supplied free of charge to small proprietors. Other measures included the cutting out of the larvae from the trunks and limbs of sound trees, and the destruction of all dead and dying branches, which places are usually selected for oviposition. There was a small outbreak on cacao of a small grasshopper, *Coscineuta* sp., which is indigenous to Trinidad, though it usually only attacks balisier and banana leaves. It was controlled by poisoned bran mash, collection in nets, and insectivorous birds. Parasol ants [*Atta*] were kept in check by the use of carbon bisulphide. *Brassolis sophorae* (coconut butterfly) in 1919 attacked young palms among the canes, and in 1920 caused some damage to cacao. In both seasons the eggs were parasitised by two species of Hymenoptera, and the pupae by a Chalcid and a Tachinid.

Sugar-cane was practically free in 1920 from *Tomaspis saccharina*, but moth borers [*Diatraea* spp.] were present as usual. It is proposed in future to plant the bulk of seedlings in April instead of May, though they are then more liable to be cut by mole-crickets, which may usually be avoided by means of protective bamboo collars. Sweet potatoes do not usually give large crops, mainly owing to the stem-boring caterpillars of the moth, *Megastes grandalis*, and in 1918 experiments were made of dipping the cuttings in Bordeaux mixture and lead arsenate before planting, and spraying twice with this mixture at a month's interval. A higher yield resulted in both cases.

Quanjer (H. M.). **New Work on Leaf-curl and allied Diseases in Holland.**—*Rept. Internat. Potato Conf., R. Hortic. Soc., London*, 1921, pp. 127–145, 6 plates. [Received 8th March 1922.]

The occurrence and development of leaf-curl and allied diseases of potatoes in Holland are discussed, and the methods employed to obtain

healthy seedlings are described. True leaf-curl is transmitted by Aphids, the extent of the infection depending on the development of the Aphids as influenced by climatic conditions. Tomatos and other Solanaceous plants can carry the disease without exhibiting the symptoms as clearly as potatoes. In Holland during the summer of 1921 *Aphis rumicis* (black aphis) was found to be abundant on potato plants, whereas *Myzus* (*Myzoides*) *persicae* is generally the common potato Aphid. Mutual infection of the selected seedlings is prevented by planting a row, about five yards broad, of mangel, beet or beans between the rows of potatoes, but in view of the occurrence of *A. rumicis* on potatoes it may be necessary in future to exclude beans and beet.

Infection also apparently varies in different localities ; in heavy soils near the sea the diseased plants infect only those nearest to them, whereas on peat and sand the infection is carried over much greater distances. The infection is also carried further in more sheltered situations. Aphids are more abundant in the sheltered places and on the sandy and peat soils than on the clay near the sea, where there is practically a constant wind blowing.

COTTON (A. D.). **The Situation with regard to Leaf-curl and Mosaic in Britain.**—*Rept. Internat. Potato Conf., R. Hortic. Soc., London*, 1921, pp. 153–166. [Received 8th March 1922.]

The observations and experiments made in Britain tend to confirm the discoveries of Dutch and American authors that leaf-curl and mosaic diseases are highly infectious and that the virus is carried from plant to plant by Aphids. The distribution of the two diseases in England, Scotland and Wales is outlined ; although they may occur in a severe form in all parts, they appear to be less prevalent in the northern and upland areas. The relative importance of meteorological and soil conditions and the presence of other food-plants in favouring attack by Aphids is discussed, and the need for research is emphasised. In Britain no special systematic work on the potato-infesting Aphids has yet been carried out. In Holland, and apparently also in America, the most usual species appears to be *Myzus* (*Myzoides*) *persicae*, Sulz. (*Rhopalosiphum dianthi*, Schr.).

It should be possible by persistent and ruthless roguing to eliminate these diseases entirely. In certain districts early lifting may prevent Aphid attack. The date of first migration depends greatly on temperature, and is an important point in determining whether the virus will reach the tubers before the crop is lifted or cut off by the frost.

SCOTT (H.). **Note on some Hymenopterous Parasites and other Enemies of *Tortrix viridana*, Linn., with further Records of Chalcididae swarming in Buildings.**—*Ent. Mthly. Mag., London*, lviii, no. 694, 3rd Ser. viii, no 87, March 1922, pp. 56–61.

It has now been proved that *Pteromalus deplanatus*, Nees, is a parasite of *Tortrix viridana*, L., and further records are given of the swarming of this Chalcid in houses [*R. A. E.*, A, vii, 143]. *Stenomalus muscarum* is also recorded as swarming in houses, but very little is known about its hosts, though it is said to have been bred from puparia of Muscid flies.

Other enemies of *T. viridana* are the Ichneumonids, *Phaeogenes stimulator*, Grav., widely distributed on the Continent, *Pimpla brassicariae*, Poda, and *Labrorhychus nigricornis*, Wesm., and also, according

to Morley, *Diadromus candidatus*, Grav., *Hemiteles areator*, Panz., *Theronia atalantae*, Poda, *Pimpla graminellae*, Holmgr., *P. inquisitor*, Scop., *P. pictipes*, Grav., *P. examinator*, F., *P. maculator*, F., *P. rufata*, Gmel., *Glypta cicatricosa*, Ratz., *Phytodiaetus polyzonius*, Först., *P. coryphaeus*, Grav., *Exochus globulipes*, Desv., and *Limnerium albidum*, Gmel.; and an Empid, probably *Empis livida*.

COTTAM (R.). **Notes on the Bionomics of an Aphidophagous Fly of the Genus** *Leucopis* **in the Anglo-Egyptian Sudan.**—*Ent. Mthly. Mag., London*, lviii, no. 694, 3rd Ser. viii, no. 87, March 1922, pp. 61-64.

Leucopis sp., the various stages of which are described, was found in 1914 feeding on *Aphis sorghi*, Theo., infesting dura (*Sorghum vulgare*) in the Anglo-Egyptian Sudan. The larvae of the Syrphid, *Syrphus aegyptius*, Wd., and the Coccinellids, *Coccinella vicina*, Muls., and *C. undecimpunctata*, L., also prey upon this species. In February a species of *Leucopis* was also found attacking *Aphis gossypii*, Glov., on cotton near Khartoum. The breeding of the species of *Leucopis* attacking *A. sorghi* is apparently continuous, and the generations overlap. Under laboratory conditions the average number of eggs laid by each female was 34, but under natural conditions probably more are laid. They are deposited singly and are attached horizontally to the surface of the leaf close to the colonies of Aphids. On *Sorghum* they are invariably found on the lower surface, but on cotton they occur on the upper surface of the leaves. The eggs hatch in two days; the larval period lasts five and the pupal stage four, giving a total cycle from egg to egg of 13 days. The *Leucopis* is parasitised by a Chalcid not yet determined.

BLAIR (K. G.). *Carpophilus ligneus*, **Murray, in Britain.**—*Ent. Mthly. Mag., London*, lviii, no. 694, 3rd Ser. viii, no. 87, March 1922, p. 65.

Carpophilus ligneus, Murr., is recorded from various localities in Britain on dried Californian plums, dried apples and jelly blocks, and it is possible that this beetle may spread rapidly as a commercial pest.

A key is given to the species of *Carpophilus* recorded by Fowler.

GAHAN (A. B.). U.S. Bur. Ent. **A List of Phytophagous Chalcidoidea with Descriptions of two new Species.**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 2, February 1922, pp. 33-58, 1 plate.

Phytophagous habits among Chalcids are considered to be of fairly recent date, and this theory is supported by the fact that certain species of Eurytomids are parasitic in their early stages and finish their development as plant feeders. This adaptation was probably first forced upon the parasite by premature exhaustion of the natural food supply due to attacking a host which was insufficient in itself to furnish food for complete development.

A list is given compiled from the literature of the species of Chalcidoidea said to be phytophagous, with exception of the fig insects.

The new species described are the Eulophid, *Rhicnopeltella eucalypti*, reared from galls on *Eucalyptus globulus* from New Zealand, and the Eurytomid, *Harmolita phyllostachitis*, reared from young stems of bamboo, *Phyllostachys bambusoides*, from Florida.

Harmolita poaeola, n. n., is suggested for *H. poae*, Phillips & Emery [*R.A.E.*, A, vii, 470] (not Schlechtendal 1891).

CUSHMAN (R. A.). U.S. Bur. Ent. **The Identity of a Hymenopterous Parasite of the Alfalfa Leaf Weevil.**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 2, February 1922, p. 64.

Aenoplegimorpha phytonomi, Vier., a parasite of *Hypera variabilis* (*Phytonomus posticus*) in Utah, has been found to be a synonym of *Hemiteles micator*, Grav., reared from the same host in Italy.

BENTLEY (G. M.). **States' Rulings in regard to Nursery and other Shipments.**—*Tennessee State Bd. Ent., Knoxville*, Bull. 36 (x, no. 2), June 1921, 30 pp. [Received 9th March 1922.]

The regulations restricting the shipment of nursery stock and other products that might bring about the introduction of quarantined insect pests and plant diseases have been revised up to June 1921, and are here given in alphabetical order according to the States concerned.

QUAINTANCE (A. L.) & SHEAR (C. L.). **Insect and Fungous Enemies of the Grape.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1220, 1921, 75 pp., 79 figs. [Received 9th March 1922.]

Brief notes are given on the life-histories of and remedial measures for the principal insect and fungous pests of the grape. The former include: *Polychrosis viteana*, Clemens (grape berry moth), *Craponius inaequalis*, Say (grape curculio), *Contarinia johnsoni*, Sling. (grape blossom midge), *Allorrhina* (*Cotinis*) *nitida*, L. (green June beetle), *Typhlocyba comes*, Say (grape leaf-hopper), *Desmia funeralis*, Hb. (grape leaf-folder), *Macrodactylus subspinosus*, F. (rose chafer), *Alypia octomaculata*, F. (eight-spotted forester), *Oxyptilus periscelidactylus*, Fitch (grape plume moth), *Macrosiphum illinoisensis*, Shimer (brown grape aphis), *Haltica chalybea*, Ill. (grape flea-beetle), *Harrisina americana*, Guér. (grape leaf skeletoniser), *Lasioptera vitis*, O.S. (grape-vine tomato gall), *Schizomyia pomum*, W. & R. (grape apple gall), *Cecidomyia viticola*, O.S. (trumpet or grape tube gall), *Pholus achemon*, Drury (achemon sphinx), *Ampelophaga myron*, Cram. (hog caterpillar), *Deilephila lineata*, F. (white-lined sphinx), *Aspidiotus uvae*, Comst. (grape scale), *Pseudococcus bakeri*, Essig (grape mealy-bug), *Schistocerus hamatus*, F. (grape cane-borer), *Ampeloglypter sesostris*, Lec. (grape cane gall-maker), *A. ater*, Lec. (grape cane-girdler), *Fidia viticida*, Walsh (grape root-worm), *Adoxus obscurus*, L. (California grape root-worm), *Memythrus polistiformis*, Harris (grape-vine root-borer), and *Phylloxera vitifoliae*, Fitch (grape phylloxera).

Formulae for the preparation of such insecticides as lead arsenate, nicotine solution, resin fish-oil soap, self-boiled lime-sulphur mixture and kerosene emulsion are given.

BROOKS (F. E.). **Walnut Husk-maggot.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 992, 4th November 1921, 8 pp., 4 plates. [Received 9th March 1922.]

Rhagoletis suavis, Lw., probably occurs wherever the black walnut (*Juglans nigra*) and butternut (*J. cinerea*) are found. It has also been reared from Persian walnut (*J. regia*) and Japanese walnut (*J. sieboldiana*). The adult flies feed on the juice exuding from the oviposition scars in the green part of the husk. On black walnut

oviposition generally occurs so late in the season that the injury caused by the larvae only takes place after the mature nuts have fallen, whereas on Persian nuts oviposition occurs earlier, and the activities of the larvae arrest the development of the nut and the kernel becomes unfit for use.

The various stages of this Trypetid are described; the eggs apparently hatch in about seven to ten days; the larvae mine in the husk and often remain in this position until the hard frosts occur; during the warmer periods of the late autumn they enter the ground for pupation, in which stage the winter is passed, at a depth of about half an inch to several inches from the surface. Most of the adults emerge the following summer, but some of the pupae remain in that stage for a second winter. In West Virginia the adults emerge about the middle of July. In rearing jars they emerged from 16th July to 8th September, covering a period of 55 days.

The natural enemies of *R. suavis* are a Hymenopterous parasite, *Aphaereta auripes*, Prov., reared from pupae in Massachusetts, and a species of *Lopidea* found feeding on the eggs. During experiments in 1920, trees bearing heavy crops of nuts were sprayed with 3 lb. lead arsenate paste to 50 U.S. gals. water on 10th August, this treatment apparently reducing the infestation. Adults confined in wire screen cages fed readily on sweetened water containing sufficient lead arsenate to give it a milky appearance, but they succumbed very slowly to the poison. Further experiments are necessary before this method can be advocated as efficient against *R. suavis*.

McConnell (W. R.). **Rate of Multiplication of the Hessian Fly.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 1008, 15th November 1921, 8 pp. [Received 9th March 1922.]

An investigation has been made into the rate of multiplication of *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly), largely as a basis for estimating the efficiency of the various species of parasites. The rate of multiplication, which is recorded in a series of tables, is very different in the two principal generations, the spring generation laying an average of 230 eggs per female, while the autumn generation lays about 285 per female. The capacity for reproduction also varies with a number of other factors, such as date of sowing, number of puparia per tiller, etc., so that the rate of multiplication will vary from year to year and even from field to field. In the spring generation about 60 per cent. of the flies are females; in the autumn one the sexes are approximately equal in number. By applying these figures, however unsatisfactory the basis may be, it is believed that entomologists will be better able to appreciate how an outbreak may develop very suddenly, and to predict more accurately the approach of a dangerous infestation.

Girard (P.). **Insectes nuisibles aux Arbres Fruitiers et aux Légumes.**—*Vie Agric. et Rur., Paris*, xx, no. 9, 4th March 1922, pp. 159–160.

Porthetria (*Bombyx*) *dispar* attacks any non-resinous tree and sometimes causes complete defoliation. Banding the trees with packing canvas under which the larvae take shelter for pupation, and under which the adults frequently oviposit, is advocated, or, in cases of severe infestation, spraying with lead arsenate. There are at least 25 natural enemies of this moth in France, and these generally reduce its numbers to the normal after a certain time.

Platyparea poeciloptera (asparagus fly) is a serious pest, particularly of the young plants that remain in the ground for three years. The remedy is to remove all the heads before 15th March and burn them, and all debris of the plants should be collected and burnt during the winter. Bibionid flies are troublesome among the vegetable crops grown on marshy lands; the larvae can be caught by means of slices of potato laid along the rows, or they can be destroyed by hot water or kerosene emulsion sprays, or by carbon bisulphide injections.

Anthonomus pomorum (apple weevil) is frequently present in orchards after a mild winter, causing the flowers to wilt. The trees should be treated in winter with an application of a 20 per cent. solution of iron sulphate, with a little lime and clay, or with a solution containing 10 per cent. iron sulphate and 5 per cent. copper sulphate.

WOLCOTT (G. N.). **El Caculo Taladrador del Tallo del Cafeto** (*Apate francisca*, **F.**). [*Apate francisca*, F., boring in Coffee Shoots.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 48, October 1921, 6 pp., 2 figs. [Received 8th March 1922.]

In Porto Rico, the Bostrychid, *Apate francisca*, F., does serious damage to coffee plants by boring in the stems, making irregular tunnels in an upward direction. The beetles are often found in numbers in one shoot, and as they generally choose the smaller ones these become very weak and either die or break off in the wind. Eggs are laid in the tunnel after the plant has died, for the larvae cannot develop in living ones, and the adults prefer to oviposit in recently killed trees rather than those that are already dead and dry. Other food-plants are citron, cedar, willow, mesquite [*Prosopis*], flamboyant [*Poinciana regia*], *Casuarina*, *Acacia* and mahogany. In one case more than 30 individuals were found tunnelling in a sugar-cane, but no eggs had been laid. A sure way of killing the beetles is to inject a few drops of carbon bisulphide into the entrance hole and immediately plug it up. Trees that have been killed by the borers should be burnt, and it is better to cut and burn any plants that show signs of infestation.

ISAAC (P. V.). **The Turnip Gall Weevil.**—*Jl. Minist. Agric., London*, xxviii, no. 12, March 1922, pp. 1130–1132, 6 figs

Ceuthorrhynchus pleurostigma, Marsh. (turnip gall weevil) does considerable damage by causing galls on the plants. The weevils generally feed on the leaves, tender bark, young pods and flowers of turnips and cabbages, and the flowers and foliage of charlock and hedge mustard, and are usually found on the lower surface of the leaves or in the soil close to the infested plants. The egg is laid in a cavity in the bark of the root, one female laying one to four per day, with a total of about 60.

There are two races of the beetles, each having one generation in a year. The one that is by far the more important economically appears about the beginning of June and oviposits from late August throughout the autumn, dying off in the winter. Turnips in all stages and other plants of about six weeks old are preferred for oviposition. The eggs hatch in about five days, or longer in cold weather, and the larvae hibernate in the galls, resuming feeding in the spring and continuing throughout March and April, when they leave the galls and pupate

after the soil has been moistened by heavy rain. The pupal stage varies according to weather conditions, but the adults emerge in late May or early June. The food-plants of this race include turnip, mustard, rape, cabbage, Brussels sprouts, cauliflower, kale and kohl-rabi. The other race of the beetles appears in the spring and breeds mostly in charlock. The adults die off by summer and the young become adults by August and hibernate as adults, reappearing in the spring. This race is not of much economic importance.

Natural enemies of *C. pleurostigma* include the common garden slug which bores into the galls and feeds on the grubs and plant tissues. The larvae of *Helophorus rugosus*, Ol. (turnip mud beetle) also bore into the gall and devour the grubs, and the parasitic Hymenopteron, *Diospilus oleraceus*, Hal., oviposits through the gall into the grub, and its larva ultimately kills the host. Certain birds pick the grubs out of the galls and devour them.

It is suggested as a remedial measure that all infested stalks should be rooted out by the beginning of March, or as early as possible in the case of spring cabbages, and stacked in large, loose heaps. The grubs are then nearly full-grown and ready to bore into the soil for pupation. They are kept back by this method until the bark has dried, so that it is impossible for them to bite through it. Infested stalks should never be left in small lots or scattered about for any length of time. Immediately the infested crop has been removed the land should be ploughed deeply (this is especially important with late crops), and in the following autumn some other crop less liable to attack should be sown. All charlock and hedge-mustard should be destroyed, as the adults feed on these, and it may be that some of the beetles emerging early from the spring race that breeds in charlock may lay eggs in the cultivated plants in autumn.

COLLINGE (W. E.). **The Food and Feeding Habits of the Little Owl. II.**—*Jl. Minist. Agric., London,* xxviii, no. 12, March 1922, pp. 1133–1140.

After an investigation extending over three successive years, and after examining the stomach contents of 194 individuals of both adults and nestlings of the Little Owl, and analysing 267 pellets and many hoards, the author has reached the conclusion that injurious and neutral insects and voles and mice constitute the main items of food. There seems no possibility of doubt respecting the value of this bird to the agriculturist; it is said that no other bird, except the lapwing, destroys so large a percentage of click beetles and wireworms.

DOOLITTLE (S. P.). **Overwintering of the Bacterial Wilt of Cucurbits.**—*Phytopathology, Lancaster, Pa.,* xi, no. 7, July 1921, pp. 229–300.

As a result of observations carried out in 1917–20 it is evident that *Diabrotica vittata* (striped cucumber beetle) is able to carry the organism of bacterial wilt (*Bacillus tracheiphilus*) through the winter. These findings confirm those of previous authors [*R.A.E.*, A, viii, 422; ix, 5].

ROBBINS (W. W.). **Mosaic Disease of Sugar Beets.**—*Phytopathology, Lancaster, Pa.,* xi, no. 9, September 1921, pp. 349–365, 8 figs.

This account of mosaic disease of sugar beet is based on field observations and experiments in northern Colorado and western Nebraska.

Attempts to produce the disease by inoculation, with a needle, of freshly prepared juice and the insertion of freshly crushed fragments of mosaic leaves into slits on the leaf petioles and crown were unsuccessful. There is also no evidence of seed transmission of the disease. The virus retains its vitality throughout the silo period, which is the only means of overwintering thus far known. Aphids are able to carry the infection, and in cage experiments healthy plants were infected by *Myzus persicae*. The incubation period of the disease on seed beets under greenhouse conditions is about 24 days, and on seedling plants from 12 to 18 days.

SEVERIN (H. H. P.). **Minimum Incubation Periods of Causative Agent of Curly Leaf in Beet Leafhopper and Sugar Beet.**—*Phytopathology, Lancaster, Pa.*, xi, no. 10, October 1921, pp. 424–429, 1 fig.

From the experiments here described it is evident that *Eutettix tenella*, Baker (beet leaf-hopper) is non-infective when it hatches from the egg, neither is it a mechanical carrier of curly leaf even in mass infection of a beet. The causative agent of the disease requires at least four hours for incubation in the leaf-hopper at an average temperature of 100° F., with a minimum of 94° and a maximum of 103°, and at least five days in the beet at an average temperature of 72·8° F., with a minimum of 53·3° and a maximum of 93·6°.

ADAMS (J. F.) & MANNS (T. F.). **The Corn Ear Worm and Kernel Rot of Corn.**—*Phytopathology, Lancaster, Pa.*, xii, no. 1, January 1922, pp. 25–26.

Injury to maize by the corn ear-worm [*Heliothis obsoleta*, F.] has been constantly followed by the occurrence of infection by *Fusarium moniliforme* and *Cephalosporium sacchari*. Observations show that this moth is capable, in the course of its injury to the ear, of furthering the source of infection when established.

LEACH (J. G.). **Leafhopper Injury of Potatoes.**—*Phytopathology, Lancaster, Pa.*, xii, no. 1, January 1922, p. 37.

A new pathological condition of potatoes is described as being prevalent during 1921 in Minnesota. It is characterised by a pronounced shortening of the leaf petioles with consequent crowding of leaflets. *Empoasca mali* (potato leaf-hopper) was continually associated with this condition, and has been proved by experiment to be responsible for it. Sufficient data have not yet been obtained to justify conclusions as to the nature of the disease or its relation to hopper-burn.

GODFREY (G. H.). **The Stem and Bulb infesting Nematode.**—*Phytopathology, Lancaster, Pa.*, xii, no. 1, January 1922, pp. 52–53.

Tylenchus dipsaci (*devastatrix*) occurs in America on red clover, lucerne, strawberry and daffodils. In Europe it is a serious pest of daffodils and hyacinths. Attention is drawn to the necessity of watching for it generally on all susceptible plants and promptly reporting any new occurrence.

Rankin (W. H.), Hockey (J. F.) & McCurry (J. B.). **Leaf Curl and Mosaic of the Cultivated Red Raspberry.**—*Phytopathology, Lancaster, Pa.*, xii, no. 1, January 1922, p. 58.

Aphis rubiphila, Patch, has been proved to be the transmitting agent of leaf-curl and mosaic disease of raspberry in Ontario, though no causal organism for either disease has been found. Roguing in August is advocated as a means of control. The entire root of the canes should be removed immediately to prevent the migration of Aphids to healthy ones.

Eyer (J. R.). **Preliminary Note on the Etiology of Potato Tip-burn.** —*Science, Garrison-on-Hudson, N.Y.*, N.S., lv, no. 1416, 17th February 1922, pp. 180–181.

Tip-burn of potatoes may be produced by the extract made from macerated nymphs or adults of *Empoasca mali*, Le B., and is transmissible by direct inoculation. The active principle is most virulent in the nymphal stage of the leaf-hopper. The virus is present in diseased leaf tissue after infection and may be transmitted to healthy plants by reinoculation. The disease cannot be simulated by inoculation of extracts or by feeding of insects other than *E. mali* or by mechanical injury. Although sunlight is an important factor in the progress of the disease, its absence does not prevent occurrence.

Weiss (H. B.) & West (E.). **Additional Notes on Fungous Insects.**—*Proc. Biol. Soc. Washington, D.C.*, xxxiv, no. 34, 21st December 1921, pp. 167–172, 1 plate.

A further list is given of insects feeding on fungi, arranged according to families, and previous records are reviewed [*cf. R.A.E.*, A, ix, 199].

Headlee (T. J.). **Report of the Department of Entomology, 1919-20.** —*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.*, 1921, pp. 415–505, 20 tables, 4 figs., 4 plates. [Received 9th March 1922.]

During 1919–20 Aphids were not only far less abundant in orchards, but the predominant species, the oat aphis [*Siphonaphis padi*], was the least injurious. During 1919 the green apple aphis [*Aphis pomi*] reappeared in considerable numbers during the latter part of the summer, and it is thought that the low temperatures reacted unfavourably on its natural enemies, thus accounting for the outbreak. The serious injury caused by the pink and green potato aphis [*Macrosiphum solanifolii*] in 1918 was repeated. The green cloverworm [*Plathypena scabra*] was abundant on all kinds of beans. Damage was promptly checked with powdered lead arsenate and lime-sulphur (1 : 5). Lead arsenate in Bordeaux mixture or water to which twice the amount of fresh slaked lime had been added was also effective. When applied as a dust the plants must be thoroughly coated, using at least 30 lb. to the acre, and when applied as a spray 6 lb. of powdered lead arsenate should be used to the acre. Paris green and lime or calcium arsenate and lime scorch the foliage. The main point in the control of plum curculio [*Conotrachelus nenuphar*] lies in making a sufficient number of careful sprayings to maintain the coating of the fruit throughout the period covered by its injury, which usually lasts for about four weeks from the falling of the blossoms

The results of investigations of *Psylla pyricola* for the last five years are recorded, and have already been noticed [*R.A.E.*, A, viii, 44; ix, 523, 525]. During 1919 applications were made wherever honey-dew appeared on the lower surfaces of the leaves with 1 gal. commercial liquid lime-sulphur to 40 gals. water, 1·5 lb. powdered lead arsenate being added to each 50 U.S. gals. mixture. If the weather was hot, self-boiled lime-sulphur was substituted. In some cases attempts were made to meet hot weather conditions and prevent scorching of foliage by reducing the strength of the liquid concentrate by using 1 gal. to 50 or 60 gals. water. The liquid concentrate gave the best results; with self-boiled lime-sulphur the treatment had to be much more thorough to kill as large a percentage. The lead arsenate was added to control side-worm injury with excellent results. The application was made from below and at a pressure of 250 lb. During autumn, before all the leaves were off, the weather became cold and the Psyllids were found clinging to the twigs and branches, which were sprayed with winter-strength soluble oil till the weather became warmer. When winter finally came the pest had completely disappeared, and this spray was again used when it reappeared in the spring.

Larvae of *Cydia pomonella* were observed entering apples at points other than the blossom end during two distinct periods, one early and the other late in the season. A prompt and thorough application of an arsenical spray gave complete control until the coating was broken. The three main problems for the control of *Cydia pomonella* in New Jersey appear to be concerned with the comparative value of the three sprays usually recommended for its control; the type of material and the method of its application; and the finding of a relation between the time that the spray should be applied and the development of the trees. The author considers that the three sprays are absolutely essential. Lead arsenate is the best insecticide. Experiments were made to test the relative value of dusts and sprays. Though the former can completely cover the foliage and fruit, they are not so effective as spraying, as they do not stick. Data for the present season on the third problem are not yet available.

The various experiments undertaken each year since 1913 with insecticidal dusts are recorded, and the conclusions arrived at are that lead-arsenate-sulphur-lime is a satisfactory substitute for self-boiled lime-sulphur for the control of curculio, scab and brown rot of peach. The lead-arsenate-sulphur dust, in view of its relative failure to effect control of codling moth and plum curculio, cannot be considered a satisfactory substitute for present well-known sprays in the control of these insects on apple. A thorough investigation should be undertaken to find forms of dust that will stick to apple fruit and foliage as well as or better than liquid mixtures.

PETERSON (A.). **A Preliminary Report on the Use of New Mechanical Protectors for the Control of the Peach Tree Borer,** *Sanninoidea exitiosa*, **Say.**—*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.*, 1921, pp. 461–468, 2 plates, 1 table. [Received 9th March 1922.]

A description is given of new mechanical protectors and experiments with them for the control of *Aegeria* (*Sanninoidea*) *exitiosa* (peach tree-borer). These were devised as a substitute for the tarred paper collars, which have not effected complete control.

They give promise of materially reducing or preventing infestation provided that they are properly adjusted and tightly sealed during the entire season (15th June to 15th September). The serious objections to their use are that the cost is very great, they are difficult to apply, and they need constant attention in order to maintain a perfect seal.

PETERSON (A.). **The Strawberry Root-worm, a Serious Pest on Roses in the Greenhouse.**—*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.*, 1921, pp. 468–493, 1 fig., 3 plates, 6 tables. [Received 9th March 1922.]

Up to the present *Typophorus canellus* (strawberry root-worm) has been found in only one greenhouse in New Jersey. The adult beetles feed out-of-doors on strawberries, raspberries, blackberries and rose bushes, while the larvae have been found on strawberries. Other investigators report the adults on blackberries, juniper, crab-apples, and other wild and cultivated plants.

The beetles make small irregular holes through the leaf; they also feed on young shoots, green stems and occasionally on young flower buds. At times the scarring is severe enough to girdle the stems completely. They feed at night or on cloudy days. In bright sunlight they hide in the soil or beneath leaves. The larvae may seriously damage the roots of strawberries and other plants.

A description is given of the female adult and all other stages. The eggs are usually deposited in groups of two to five. Experimentally the first group of eggs was observed on the 4th February, and oviposition continued until 22nd April. The majority of eggs hatched in 6–10 days and the larvae became mature in 60–70 days. The pupal stage lasts 8–11 days, and the total life-cycle appears to be 80 or 90 days, but this may vary considerably under different indoor conditions. The majority of the adults of this first generation appear late in May or in June. Those of a second generation emerge late in September, and then, after feeding to some extent on foliage, enter hibernation.

Various experiments were undertaken in greenhouses for the control of this pest. The effect of fumigation with hydrocyanic acid gas has already been noticed [*R. A. E.*, A, viii, 312]. Spray tests show that Paris green at the rate of 4–8 oz. to 50 U.S. gals. water does not kill the adults in sufficient quantity to warrant its use, and 8 oz. to 50 U.S. gals. water may scorch the rose foliage. The addition of brown sugar to the spray improved the killing power of every poison tested. Preliminary experiments indicate that some dusts, if properly applied in the greenhouse, may be of considerable value. The most satisfactory time to dust the rose bushes is in June or July, when the adults are abundant. Dusting plants during the growing season is apt to be unsatisfactory. As larvae have been found six inches deep in the soil, it is necessary for a fumigant to penetrate all portions of it. Small doses of sodium cyanide, when applied in water or in granulated form, were found to kill the larvae and pupae, but also to injure the plants. Varying strengths of nicotine up to 4 cc. to 1 litre of water were used with very little success. With poisoned baits, sodium arsenate, 2 gm. to 50 cc., gave the most rapid and highest percentage of mortality. Dead leaves soaked with poison bait and scattered on the soil have little or no effect. The most promising method is the suspension of the bait, which must be moist, at one or several points in the centre of each bush. The beetles are not attracted to light.

BECKWITH (C. S.). **Cranberry Investigations.**—*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.*, 1921, pp. 493–505, 7 tables, 1 fig. [Received 9th March 1922.]

A number of causes led to a serious outbreak of cranberry blossom-worm [*Epiglaea apiata*]. The reflooding used in controlling fire-worms [*Rhopobota vacciniana* and *Peronea minuta*] is now done every third year instead of every year, with the result that *E. apiata* has increased and become a pest of first importance during the third year. The presence of the larvae was determined about the time the earliest buds began to show colour, and reflooding was immediately adopted. A complete flooding for 24 hours will control this pest.

The cranberry girdler [*Crambus hortuellus*] attacks the higher and well-drained portions of the bogs, and so is out of reach of ordinary flooding operations. Experiments against it with sodium cyanide were inconclusive.

FELT (E. P.). **34th Report of the State Entomologist on Injurious and Other Insects of the State of New York, 1918.**—*New York State Mus. Bull., Albany, N.Y.*, nos. 231–232, March–April 1920, 288 pp., 56 figs., 20 plates. [Received 9th March 1922.]

Observations on the relation between high evening temperatures and oviposition, and the spraying experiments undertaken against *Cydia pomonella*, L. (codling moth), are described, and the history and bionomics of and remedial measures against *Pyrausta nubilalis*, Hb. (European corn-borer) are recorded.

During 1917 and 1918 *Sitodiplosis* (*Thecodiplosis*) *mosellana*, Gehin, was unusually abundant. It has been previously assumed that the midge destructive in New York was identical with the species responsible for general and extended damage in earlier years in certain European countries, particularly England and France, but it has now been proved that the European species is *Contarinia tritici*, Kirby, and the American species *S. mosellana*. In rye fields this insect causes white heads, and a yellowish cast showing through the bracts covering the green indicates the probable presence of the larvae. In wheat fields infestation may be found by rubbing heads in the hand, and if the insect is present, the larvae will drop out of the bracts. A full description is given of both sexes. The early American history and the observations of previous authors on the life-history of this pest are recorded. The larvae hibernate in the soil or in chaff, pupating in the spring, and the adults emerge in early June, particularly during a hot and sultry period. The larvae mature before the wheat hardens; they then drop to the ground during a rain or heavy dew and penetrate about one inch below the surface. Figures are given showing the liability of different varieties to injury by this pest. There was a very general, and in some cases excessive, infestation of rye. A survey emphasised the fact that the more vigorous fields of wheat were as a rule less affected. Unusually cool, moist weather keeps the grain in a more succulent, and therefore presumably a more favourable, condition for the growth of the larvae and activities of the adults, and dry, warm weather restricts the time when the females can deposit eggs.

The prolonged period during which this insect is in flight and its general distribution throughout grain-producing areas render it improbable that practical modifications in time of sowing, in rotation

of crops or method of preparation, would have any material influence on the pest. The best possible preparation of soil to promote vigorous growth, and the following of previous methods are recommended.

The further spread of *Hemerophila pariana*, Clerck (apple and thorn skeletoniser) is reported, and it has been found that there are two, if not three, generations of this moth in a year. A common Tachinid parasite, *Exorista pyste*, Wlk., has been reared from it. *Conotrachelus crataegi*, Walsh (quince curculio) was reported as injurious to pears. *Magdalis barbicornis*, Latr., skeletonises the undersides of quince leaves. Against *Byturus unicolor*, Say (raspberry beetle), the measures recommended are early and heavy applications of 8 lb. paste lead arsenate to 100 U.S. gals. water before the beetles have caused material injury.

Pests of gardens include *Lachnosterna* (*Phyllophaga*) *fusca*, Frohl., which was not so injurious as usual, probably owing to natural enemies such as the Asilid, *Promachus fitchi*, O.S. A judicious rotation of crops, care being taken not to plant maize, potatoes and other susceptible crops on land badly infested by the young grubs, will assist in avoiding injury in subsequent years. The marked three-year periodicity of attacks should also be kept in mind.

Macrosiphum solanifolii, Ashm. (potato aphis) was abundant, and is very injurious to tomatos, as a serious infestation results in the bloom dropping without the setting of the fruit. Egg-plants and peppers were also severely damaged. Early and thorough spraying with nicotine soap preparation is the best remedial measure, using ¾ pint (40 per cent. nicotine) to 100 U.S. gals. water, to which should be added 6–8 lb. of any cheap soap. It is essential to spray from below, and several sprayings may be necessary.

Maize and grass pests include *Crambus luteolellus*, Clem. (grass webworm) and other species such as *C. vulgivagellus*, Clem., and *C. trisectus*, Wlk., which feed upon the lower portion of the leaves and stalk. Frequent crop rotation should be practised, and where the moths are numerous, maize and other susceptible crops should be kept at some distance from grass. Early autumn ploughing in mid-August or early September on badly infested land will destroy many larvae and so prevent injury next season. If this is impracticable, spring ploughing should be delayed as late as possible so as to allow the larvae nearly to complete feeding before the sod is turned under. *Oligia* (*Hadena*) *fractilinea*, Grote (lined corn-borer), in early June, tunnels in the stalks and eats the heart of maize. It appears to be a comparatively rare moth in New York State, and little is known of its life-history and habits. It is probable that the larvae hibernate in the sod like other Noctuids, and when the grass, which is their natural food, is destroyed, they eat whatever is at hand. The adults appear at the end of July or early August.

Miscellaneous pests include *Elaphidion villosum*, F. (maple and oak twig-pruner), which tunnels in the twigs and smaller branches. The adults appear in midsummer and deposit eggs during July in the smaller twigs. The most practical method is the collection and burning of infested twigs in the autumn, spring and early summer. Spraying with lead arsenate at the end of July may be effective in destroying the adults before they deposit eggs. The larvae and pupae described in the Report for 1914 as those of *Pionea* (*Phlyctaenia*) *terrealis*, Treits. [*R.A.E.*, A, iv, 76] have now been determined as those of *Pyrausta theseusalis*, Wlk. A description is given of the larva of

Gnorimoschema banksiella, Busck, which was found infesting mummied peaches. Norway maples were infested with a leaf-hopper, *Alebra albostriella*, Fall., and soft maple leaves were generally infested with a mite, *Phyllocoptes quadripes*, Shim.

This Bulletin also contains an appendix of 160 pages, which forms Part VII of the author's monograph on gall-midges.

ACKERMAN (A. J.). U.S. Bur. Ent. **Arsenical Spray Residue on Harvested Fruit in relation to the Control of Codling Moth on Pears.**—*Mthly. Bull. California Dept. Agric., Sacramento*, xi, no. 1, January 1922, pp. 12–28, 5 figs.

From the experiments here described it is evident that the codling moth [*Cydia pomonella*, L.] may be controlled, and arsenical spray residues avoided, by the use of proper methods. Spraying should be done very thoroughly with a good equipment at a high pressure. In pear orchards where the infestation is not very serious three sprays should prove sufficient; they should consist of a calyx spray, another three to four weeks later just before the first larvae hatch, and a third two to three weeks after the second just previous to the hatching of the maximum number of larvae of the second brood. If necessary a fourth spray may be applied two to three weeks before the first picking of the fruit. If the infestation is very heavy, it is advisable to apply a second calyx spray seven to ten days after the first. Coarse drenching should be avoided by using a nozzle with a disk opening of about $\frac{1}{32}$ inch for cover sprays. Even with a very fine spray it is essential that the last cover spray be applied two to three weeks before the first picking. The strength advocated for the sprays is 2 lb. lead arsenate paste to 50 U.S. gals. water at a pressure of 225 to 250 lb. Dusting is not advocated, as even four or five applications failed to control the infestation.

ESSIG (E. O.). **Para-dichlorobenzene, a Soil Fumigant.**—*Mthly. Bull. California Dept. Agric., Sacramento*, xi, no. 1, January 1922, pp. 28–30, 1 fig.

The method of applying paradichlorobenzene for the control of the peach tree-borer, *Aegeria exitiosa*, Say, is described [*cf. R.A.E.*, A, ix, 325]. In California, applications should be made between May and November provided that the soil temperature is over 55° F. and the soil moisture not excessive. The conditions in California are so different from those in the southern and eastern States that unusual problems may be expected in the handling of the material and its uses may be greatly enlarged. *A. exitiosa* infesting apricot trees on myrobalan stocks has been successfully treated without any injury to the trees. Paradichlorobenzene is apparently also effective against *Eriosoma lanuginosum*, Hartig, infesting three- and four-year-old pear trees.

DURUZ (W. P.). **The Peach Twig-borer and its Control.**—*Mthly. Bull. California Dept. Agric., Sacramento*, xi, no. 1, January 1922, pp. 58–62, 3 figs.

Anarsia lineatella, Z., is widely distributed in California, where it attacks peach, almond, apricot, nectarine, plum and prune. The annual loss caused by this moth amounts to over £200,000. With

the warm weather of the early spring the hibernating larvae become active and eat into the buds and growing tips, causing them to wilt and droop. Pupation occurs under the bark or in old pruning wounds about the 1st May. The adults appear about a week later and deposit eggs on the stems and petioles of the leaves. The larvae of this brood appear between 5th and 10th June, and at once begin eating the flesh of the fruit. The life-cycle of this generation develops very rapidly, the adults appearing about 20th–25th June. The larvae of this generation also attack the fruit, though many of them hibernate until the following spring.

The larvae may be reached by contact sprays while they are under the bark and by stomach poisons when they are feeding. From experiments that are still in progress it would seem that a combination spray of lime-sulphur and lead arsenate (neutral or basic) will control *A. lineatella*, as well as peach leaf-curl and peach blight, if applied as the buds are swelling. Exceptionally good results were also obtained with nicotine sulphate and zinc arsenite.

Essig (E. O.) & Smith (E. H.). **Two interesting new Blister Mites.**—*Mthly. Bull. California Dept. Agric., Sacramento,* xi, no. 1, January 1922, p. 63.

A species of *Eriophyes* is recorded as injuring various varieties of figs, and another as attacking the green and ripening fruit of Himalaya blackberries, in California. The nature of the injury is described, and experiments are planned with a view to ascertaining to what extent these mites are responsible for this injury and the best means of controlling them.

Strong (L. A.). **Bureau of Plant Quarantine. Synopsis of Work for the Months of September and October 1921.**—*Mthly. Bull. California Dept. Agric., Sacramento,* xi, no. 1, January 1922, pp. 67–72.

The pests intercepted during September and October were:—From Central America, *Copturus* sp. and *Solenopsis* sp. in mahogany logs; *Pseudococcus* sp., *Chrysomphalus scutiformis, Icerya purchasi, Aspidiotus cyanophylli* and *A. cydoniae* on bananas; and *Lepidosaphes beckii* on oranges. From Mexico, *L. beckii* on oranges; *Cremastogaster* sp. and larvae and pupae of borers in timber; *Silvanus surinamensis, Tribolium ferrugineum, Cis* sp. and an undetermined cricket in botanical specimens; and an undetermined Coleopterous larva in gourds. From New Mexico, *Cydia pomonella* and *Aspidiotus perniciosus* on apples. From Oregon, *C. pomonella* in apples and in pears. From Arizona, *Heliothis* (*Chloridea*) *obsoleta* in maize. From Utah, *C. pomonella* in apples. From Georgia, *Ephestia* sp. in peanuts. From Maryland, *Plodia interpunctella* in Japanese chillies. From Virginia, *P. interpunctella* in peanuts. From Idaho, *Hypera variabilis* (*Phytonomus posticus*) on potato sacks. From Missouri, *Lepidosaphes beckii, L. gloveri* and *Parlatoria pergandei* on Florida-grown grapefruit. From Washington, *Aphodius pardalis* in potato cars; and *Aspidiotus perniciosus* and *C. pomonella* on apples. From New York, *A. perniciosus* on apples. From Pennsylvania, *C. pomonella* and *A. perniciosus* on apples. From Tennessee, *Balaninus* sp. in chestnuts. From Florida, *Lepidosaphes beckii* on grapefruit. From Nebraska, undetermined borers in apple stock. From Brazil, *L. beckii* on oranges.

From the Hawaiian Islands, undetermined weevils in algaroba seeds; *L. beckii* on oranges; *Aspidiotus lataniae, Hemichionaspis minor, Chrysomphalus aonidum, Ripersia palmarum* and *Hypomoscoma* sp. on coconuts; *Diaspis bromeliae* and *Pseudococcus bromeliae* on pine-apples; *Coccus elongatus* on betel leaves; *Cylas formicarius* on sweet potatoes; and undetermined Coccids on ti wood and pot plants. From Australia, *Pheidole* sp. in bamboo; *Pseudococcus longispinus* and *Diaspis (Aulacaspis) rosae* on rose plants; and mites, springtails, millipedes and spiders on iris bulbs. From China, undetermined Lepidopterous larvae in Chinese pears, sunflower seeds and black beans; *Cathartus* sp. in narcissus bulbs; *Odonaspis inusitata* on bamboo; *Euscepes batatae* and *Cathartus advena* in yams; *Calandra granaria* in packing of bulbs; undetermined weevils in sweet potatoes; and undetermined Coleoptera on medicinal roots. From Siam, *Dinoderus minutus* and *Lasioderma serricorne* in bamboo. From India, *Bruchus chinensis* in lentils; *Cathartus advena* in algaroba pods; and undetermined Lepidopterous larvae in bean pods. From Palestine, *Chrysomphalus aurantii, Lepidosaphes beckii, Pseudococcus citri* and *Parlatoria pergandei* on citrus fruit. From Holland, *Rhizoglyphus* sp. on hyacinth and narcissus bulbs; *Cathartus advena* and undetermined Lepidopterous larvae in hyacinth bulbs; and *Tribolium confusum* on buckwheat husks used for packing bulbs. From France, *Cathartus advena* and *Laemophloeus pusillus* in bulbs. From Sicily, *Aspidiotus hederae* on lemons.

THOMSON (G. M.). **The Naturalisation of Animals & Plants in New Zealand.**—*Cambridge*, The Univ. Press, 1922, x + 607 pp., 1 map. Price 42*s*.

This is an admirable attempt to record the changes in the fauna and flora of New Zealand (possibly the only country for which this could be attempted with a reasonable hope of success) during the past 150 years, and gives data regarding the introduction of every species and its subsequent success or failure. As an example of past acclimatisation blunders in New Zealand, the author cites the contemplated introduction in 1916 of Australian swallows, for the purposes of controlling noxious insects, without any previous enquiry as to their food-habits, or even as to whether the birds are migratory; the extreme importance of expert biological advice in future acclimatisation experiments is emphasised.

Included in a lengthy chapter dealing with over 300 introduced species of insects is an account of the introduction of humble bees, *Bombus* spp., for the fertilisation of red clover (*Trifolium pratense*), which is now extensively cultivated, but which previous to the advent of these insects only produced seed to a very limited extent. Within nine years of the liberation of 90 queen bees in 1885, £200,000 was realised on red-clover seed alone. Another beneficial introduction, in 1900, was that of the Coccinellid, *Rhizobius ventralis*, Erichs., which suppressed a serious outbreak of the scale, *Eriococcus coriaceus*, attacking *Eucalyptus* sp., and is now very common.

Important introduced pests include the diamond-back moth, *Plutella maculipennis*, Curt. (*cruciferarum*, Z.) introduced over 30 years ago, and now abundant, and *Brevicoryne (Aphis) brassicae*, L. (cabbage aphis), which is now the most destructive introduced insect in New Zealand, where it causes an estimated annual loss of over £250,000.

Although much of the detailed information presented in this excellent work does not come within the field covered by this *Review*, chapters on the interaction of endemic and introduced faunas, and the alteration in the flora since European occupation, contain much data of entomological interest. A digest of the legislation relating to acclimatisation, including a résumé of the regulations guarding against the introduction of insect pests, bee diseases, etc., and a bibliography of 16 pages, conclude this comprehensive study of a subject of far-reaching importance.

MERCET (R. G.). **Fauna Ibérica: Himenópteros: Fam. Encírtidos.**—*Mus. Nac. Ciencias Nat., Madrid*, 25th December 1921, xi + 732 pp., 292 figs. [Received 11th March 1922.]

Though the author disclaims any attempt at having produced a monograph of the Encyrtids of Spain, this volume enumerates and describes all those species that have, up to the present time, been found in the Iberian Peninsula. In the preparation of this work some 2,000 species have been collected and examined, and, as no previous records were in existence, the habitat and bionomics had to be studied by the author and his colleagues. Some of the present identifications are probably erroneous, especially as many types were not available for comparison, but it is hoped that the work may serve as a basis for recognition of the species.

A comprehensive index is given, with an appendix containing some additional species captured during the time the book was in course of publication.

SILVESTRI (F.). **Stato attuale della Lotta contro la Mosca delle Olive.** [The Present State of Work against the Olive Fly.]—*Inst. Naz. Agricoltura, Rome*, 1922, 31 pp., 6 figs.

The various methods of artificial control of *Dacus oleae* [*R.A.E.*, A, ix, 586] are fully described. The measures employed in Greece [*R.A.E.*, A, x, 3], with the spray applied only to a part of the tree, have given good results, and if success attends the proposed campaign in Corfu [*R.A.E.*, A, x, 128], it will mean a great advance in the artificial method.. If, however, the spray also destroys useful insects, its application must be limited to those years in which the olive fly is abundant and the olive crop is a large one.

Natural control should be based on the author's conviction that *D. oleae* is not indigenous in Italy. The work that has been done in this connection is reviewed, and biological notes are given on the following parasites: *Opius africanus*, Sz., var. *orientalis*, Silv., *O. dacicida*, Silv., *Bracon celer*, Sz., *Allomphale cavasolae*, Silv., and *Halticoptera daci*, Silv. Up to now the attempts to establish exotic parasites of *D. oleae* in Italy do not appear to have been successful, but the parasites were imported in small numbers and at unfavourable seasons. In 1920 the Italian Ministry of Agriculture appropriated funds for an investigation in north-western India, which is perhaps the original home of *Olea europaea*, but the unfavourable exchange caused the plan to be abandoned temporarily. Sufficient funds for combating the olive fly, and studying other problems connected with the olive, might be obtained by contributions levied on olive growers.

APPEL (—). **Die wirtschaftliche Bedeutung der Pflanzenkrankheiten und die Mittel zu ihrer Bekämpfung.** [The Economic Importance of Plant Diseases and the Means for combating them.]—Separate from *Arb. Deutschen Landw. Ges.*, no. 314, 1921, 18 pp.

In Germany there is no universal legislation on plant protection, so that the direct intervention of the State is not possible except where Imperial legislation exists in a few cases, such as that respecting the vine-louse [*Phylloxera*], Colorado potato beetle [*Leptinotarsa decemlineata*] and San José scale [*Aspidiotus perniciosus*]. At the present time the chief service rendered in plant protection is educational in character. The results have proved satisfactory, there being a great demand for instructive literature on the part of agriculturists.

APPEL (—). **Die Organisation des Pflanzenschutzes im Deutschen Reich.** [The Organisation of Plant Protection in the German Empire.]—Separate from *Arb. Deutschen Landw. Ges.*, no. 314, 1921, 18 pp.

A brief account is given of the organisation of plant protection work in Germany since its inception in 1889.

THIEM (H.). **Die Frostspannerplage im Niederungsgebiet der Weichsel bei Marienwerder Wstpr. und Beiträge zur Biologie des kleinen Frostspanners.** [The Winter Moth Outbreak in the low-lying Vistula Region near Marienwerder, West Prussia, and Contributions to the Biology of *Cheimatobia brumata*.]—*Arb. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, xi, no. 1, 1922, 94 pp., 10 figs.

This outbreak of *Cheimatobia brumata*, L., occurred from 1916 to 1920 in the low-lying Vistula region near Marienwerder. The losses from 1916 to 1919 amounted to £90,000 (at par), while remedial measures in 1919 and 1920–21 cost £2,325 (at par).

The complete eradication of *C. brumata* in this district is not possible, but general banding can—if properly applied—eradicate it in the orchards and along the roads. Generally speaking, the autumn bands should be applied in western Germany by 25th October, in central Germany by the 20th, and in eastern Germany by the 15th. The spring bands must be arranged about mid-March in years when the weather is mild and favours egg development. The date is indicated by the dark coloration of the reddish-yellow eggs below the banding. The autumn bands must be kept in condition up to mid-January and the spring ones up to mid-May. Banding must include those trees that are food-plants of *C. brumata* as well as infested ones. All worthless plants should be destroyed, and such bushes as are of economic value, but difficult to band, require special treatment.

Spraying with fruit-tree carbolineum did not give satisfactory results. The flight of the moths increases with a rising temperature. With the advent of cold weather or snow more females than males appear in the open. A thaw after a sharp frost induces a great increase in flight. Excessive dampness of the ground or a sudden thaw kills more males than females. Female moths can support a temperature of −14·9° C. [5° F.]. Oviposition usually occurs immediately after mating and in the crown, though it sometimes takes place on the trunk. One female may oviposit on several trees, but no special choice for any given variety of fruit-tree was noticed. Fertilised eggs turn from

green to yellow-brown in a few days. Just before hatching they become dark bluish or greenish; this is the time when banding must be applied. The larvae, which hatch in mid-March, are unable to attack tightly closed buds or buds thickly covered with hairs, and as they can only live without food for about a week, the cultivation of late varieties of fruit trees with tightly closed or thickly haired buds is advantageous.

The females of the large winter moth [*Hybernia*] *defoliaria* also oviposit on thin branches in the crown. Newly hatched larvae can live for 7–11 days without food at a temperature of 10° C. [50° F.].

RIEHM (E.). **Chemische Pflanzenschutzmittel.** [Chemical Agents for Protecting Plants.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, i, nos. 1 & 2, 1st July & 1st August 1921, pp. 6–7 & 9–10. [Received 13th March 1922.]

There is comparatively little precise knowledge of the action of the chemicals used for protecting plants against their various enemies, but empirical methods have established the value of a number of substances. Preparations recommended by their makers for all-round use may be rejected as unworthy of serious notice. The Imperial Biological Institute, working in conjunction with the German Plant Protection Service, has introduced a uniform system of examination with the object of determining the actual value of the numerous preparations on the market.

LANG (—). **Bericht der Württ. Landesanstalt für Pflanzenschutz Hohenheim über Rapsglanzkäferbekämpfung.** [Report of the Württemberg Land Institute for Plant Protection at Hohenheim on Work against the Rape Beetle.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, i, no. 2, 1st August 1921, pp. 10–11. [Received 13th March 1922.]

An apparatus, consisting of sticky boards attached to a handle, has given good results against the rape beetle, *Meligethes aeneus*, F. About 50 per cent. of the beetles were captured by passing over the plants once, so that three passages at least are necessary. The last of these must be done before blossoming, otherwise parts of the blossoms may interfere with the adhesive action. Furthermore, the plants are more easily damaged when advanced in growth. It is best to drown the captured beetles. Of these, *M. aeneus* represented 89 per cent., *Phyllotreta nemorum*, L., 1·5 per cent., *P. atra*, F., 8 per cent., and *Ceuthorrhynchus assimilis*, Payk., 1·5 per cent.

Spraying with Urania green also gave good results.

RABBAS (—). **Bericht der Zweigstelle Aschersleben der Biologischen Reichsanstalt über die Versuche zur Bekämpfung der Oelfruchtschädlinge im Jahre 1920.** [Report of the Aschersleben Branch of the Imperial Biological Institute on the Experiments in Combating Pests of Oil Crops in 1920.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, i, no. 2, 1st August 1921, p. 11. [Received 13th March 1922.]

Experiments in catching flea-beetles were made with a new apparatus consisting of a rectangular wooden frame on which a narrow mesh net, smeared with an adhesive, was stretched. Wires hanging loosely

beneath the frame serve to disturb the flea-beetles, which rise and are secured on the net. This arrangement proved useful in the case of low-growing plants, as there is only a small space in which the flea-beetles can attempt to escape. For tall plants insecticides are more suitable. The apparatus described in the preceding abstract proved fairly useful in the case of cabbage, but injured kohlrabi and radishes.

KORFF (—). **Schädigungen an Roggenähren, sog. Kornfrass. Ährenschäden an Liesch- (Timothee-) Gras.** [Injuries to the Ears of Rye. Ear Injury in Timothy Grass.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* i, no. 2, 1st August 1921, pp. 12–13. [Received 13th March 1922.]

Numerous complaints have been made of injury by thrips to the ears of rye. The injury ceases when the ear comes out of the leaf-sheath, but at the point where it has occurred the grain is absent in the ear. The only available measure is to stimulate growth so that the danger period may be as short as possible.

The flower clusters of timothy grass are injured by the larvae of a midge, *Cleigastra flavipes*, the great abundance of which appears to be due to premature warmth in spring and drought in early summer. Direct measures are not feasible, so that recourse must be had to deep ploughing. This is all the more advisable as it is not known whether the generation noticed here is followed by others in the course of the year.

Gefährliches Auftreten des Wiesenzünslers, *Phlyctaenodes sticticalis,* **L.** [A Dangerous Occurrence of *P. sticticalis.*]—*Nachrichtenblatt. Deutschen Pflanzenschutzdienst, Berlin,* i, no. 3, 1st September 1921, pp. 19–20. [Received 13th March 1922.]

During the summer of 1921 the sugar beet webworm, *Phlyctaenodes sticticalis,* L., partly destroyed the beet crops in Jugoslavia, Bulgaria and Hungary. It then appeared in Germany, having probably spread from Austria to Silesia. The Plant Protection Institute in Vienna advises the following measures: Where patches of beet are attacked and it is desirable to save neighbouring fields without considering the infested plants, they should be covered with straw (24 to 30 cwt. per acre) and burned, or they may be sprayed with a solution of lye. Infested plots may be isolated by means of trenches or tarred boards and the larvae collected and destroyed.

BÖRNER (C.). **Ueber die Sanierung von Reblausherden durch Anbau gepfropfter Reben.** [The Cleansing of Vine-louse Centres by planting Grafted Vines.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* i, nos. 4 & 5, 1st October & 1st November 1921, pp. 25–26 & 34–36. [Received 13th March 1922.]

Official action in Germany against the vine-louse [*Phylloxera*] has hitherto consisted in destroying infested vineyards, the replanting of which was permitted with the old European varieties of vine, grafted vines with immune or resistant stocks being prohibited. There is in Germany a movement in favour of the latter in view of the success achieved in other countries, and much experimental work is being done. The author recalls his early work on immunity [*R.A.E.*, A, ii, 156] showing that *Phylloxera pervastatrix* cannot adapt itself to certain

vines; Schneider-Orelli has obtained confirmatory results [*R.A.E.*, A, x, 79], and also Dewitz. Up to the present, Aphids of the *vastatrix* form have not been found in Germany. It is doubtful whether further search will reveal them, and care must be taken not to introduce this form from abroad. *P. pervastatrix*, which is present, must die out if only vines immune to it are grown, whereas the *vastatrix* form is able to infest vines immune to *P. pervastatrix*. As regards the above mentioned "immunity" of some vines to *P. pervastatrix*, it must be remembered that the latter attacks them, but subsequently either dies or migrates, leaving them healthy and uninfested. A second group, which is slightly infested for some time and then becomes free during the winter, is called "half-immune" by the author, who uses the term "resistant" for a third group that flourish notwithstanding infestation. In contradistinction to these are the "susceptible" vines. In Germany this question of the immunity of vines is more important than that of the races of the Aphid, for it governs the prospect of a gradual freeing of the districts infested with *P. pervastatrix*. The vines hitherto ascertained as being immune, half-immune and resistant are enumerated. It is urged that varieties of the first two groups should alone be used in the infested regions.

PETERS (—). **Ueber die Herstellung von nikotinhaltigen Spritzflüssigkeiten und den Anbau von Tabak für solche Zwecke.** [The Preparation of Nicotine Sprays and the Cultivation of Tobacco for such Purposes.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, i, no. 4, 1st October 1921, pp. 27–28. [Received 13th March 1922.]

Owing to the shortage of tobacco extracts in Germany attention is drawn to the fact that English and German investigators have shown that a nicotine spray can be prepared by crumbling tobacco leaves and soaking them in cold water as follows: 5 parts (by weight) of leaves are soaked for a day in 33⅓ parts water; the water is drawn off and the same operation is repeated twice; the three lots of liquid are then mixed together. If the tobacco leaves contain 3 per cent. of nicotine the fluid will have a nicotine content of 0·15 per cent., which can be reduced to 1 per mille by adding half as much water, though this further dilution is not advised in view of the variable amount of nicotine in the leaves. In England it has been found that *Nicotiana rustica* yields more nicotine than *N. tabacum*. Directions are given to enable vine growers to cultivate tobacco for spraying.

PETERS (—). **Ueber den Nikotingehalt verschiedener Tabaksorten.** [The Nicotine Content of various Tobaccos.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, ii, no. 2, 1st February 1922, p. 11. [Received 13th March 1922.]

As a supplement to the above paper, figures of the nicotine content of various tobaccos are given.

VOGT (E.). **Ein neuer Schwefelapparat.** [A new Apparatus for covering Plants with Sulphur.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin*, i, no. 4, 1st October 1921, p. 29. [Received 13th March 1922.]

A new and portable apparatus for covering plants with a film of sulphur is described. By its means 300 gm. [about 10 oz.] of stick

sulphur are raised to boiling point (448° C.) in an iron container, and 400 gm. [about 13 oz.] of water are boiled in a copper boiler, a spirit lamp being used to heat both. The steam is led under pressure into the boiling sulphur and blows the latter into an extraordinarily fine mist. On reaching the open air the sudden cooling makes the droplets of sulphur remain fluid for several hours, so that they retain an unusual adhesiveness. The method is simple and harmless, but can only be employed in the open air on a calm day, as the slightest wind disperses the cloud.

WILKE (S.). **Ein für Deutschland neuer Rübenschädling: Die Runkelrübenmotte,** *Phthorimaea* (*Lita*) *ocellata,* **Boyd (Microlepid).** [A Beet Pest new to Germany, *Phthorimaea ocellatella.*]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* i, no. 5, 1st November 1921, pp. 33–34. [Received 13th March 1922.]

The infestation of beet fields by the beet moth, *Phthorimaea ocellatella,* Boyd, is reported from Hessen, this being apparently the first record of injury in Germany by this Gelechiid, which is a well-known pest in France and other European countries. Information on the measures against it and its natural enemies is quoted from other sources [*R. A.E.*, A, ii, 450; vii, 193]. *Beta maritima* is the wild food-plant of the larvae, which are pests of both sugar and fodder beet.

APPEL (—) & SCHWARTZ (—). **Die Bedeutung des Vogelschutzes für den Pflanzenschutz.** [The Importance of Bird Protection for Plant Protection.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* i, no. 6, 1st December 1921, pp. 49–50, 2 figs. [Received 13th March 1922.]

As an illustration of the value of bird protection, a case is recorded of two forests in the Langensalza district separated by a road. In one of these complete defoliation by *Dasychira pudibunda* occurred in 1921, while the other, in which bird protection had long been a marked feature, remained untouched. In May 1921 a swarm of moths migrated from the infested forest into the neighbouring one, and flocks of birds were seen in the latter busily engaged in devouring the intruders.

KNOCHE (E.). **Die Nonnenkalamität im Zittauer Stadtwald.** [The Nun Moth Outbreak in the Zittau Corporation Forest.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* ii, no. 1, 1st January 1922, pp. 2–4. [Received 13th March 1922.]

An unexpected outbreak of the nun moth [*Liparis monacha*] occurred in 1920, a large portion of the swarms having come probably from Bohemia. About six million pupae and females were collected. Parasitic enemies included a species of *Microgaster,* which killed the larvae before the second moult. A few Tachinids were found in May; their numbers increased by June in low-lying places, where they attacked up to 16 per cent. of the larvae. *Trogus flavatorius,* though less abundant than the Tachinids, appeared in considerable numbers, and sometimes predominated at 1,200–1,500 ft. Predacious enemies were less noticeable than parasites. A hyperparasite infesting the Tachinids was occasionally seen.

Der Khaprakäfer, ein neuer Getreideschädling in Deutschland. [The Khapra Beetle, a new Cereal Pest in Germany.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* ii, no. 1, 1st January 1922, pp. 4–5. [Received 13th March 1922.]

The occurrence in grain stores in Berlin and on the lower Rhine of *Trogoderma khapra*, Arr., is recorded In view of this beetle having become established in England, there is a danger of its doing likewise in Germany. It should be reported as soon as noticed.

APPEL (—). **Zur Karbolineumfrage.** [On the Question of Carbolineum.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* ii, no. 2, 1st February 1922, pp. 9–10.

The differences in the results obtained with carbolineum are due to variation in the composition of the preparations now sold under this name. It is not simply a matter of testing the various brands and noting those that prove satisfactory; the product must be distilled from hard coal, and even then the variations in the composition of coal from different coal-fields, and those depending on the manner in which distillation has been performed, introduce disturbing factors, so that a maker's guarantee can only be of relative value. Furthermore, commercial brands differ widely as regards their water-content and their power of emulsification. The water-content often depends on the soap incorporated to help emulsification; in a "pure" carbolineum it should not exceed 20 per cent., while in the others the percentage should be about 30. A moderate water-content and uniform emulsification are valuable properties. It is hoped to ascertain which constituents are of insecticidal value in these preparations.

WILLE (J.). **Die biologische Bekämpfung der Blutlaus in Uruguay.** [The Biological Control of *Eriosoma lanigerum* in Uruguay.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* ii, no. 2, February 1922, pp. 10–11.

The information given here on the introduction of *Aphelinus mali*, Hald., into Uruguay against *Eriosoma lanigerum*, Hausm., is taken from a paper already noticed [*R. A.E.*, A, x, 226].

SPEYER (W.) & KAUFMANN (O.). **Leben und Schädlichkeit des Raps-Mauszahnrüsslers** (*Baris coerulescens*, **Scop.**). [The Life-history and Injuriousness of *B. coerulescens*.]—*Nachrichtenblatt Deutschen Pflanzenschutzdienst, Berlin,* ii, no. 3, 1st March 1922, pp. 20–21, 1 fig.

The investigations conducted at Naumburg since 1919 on the pests of rape crops seem to indicate that *Baris coerulescens*, Scop., is by no means as injurious as is generally believed. The adult is harmless, and even when several larvae infest one plant, the damage done by their mines is unimportant. Much of the injury ascribed to *B. coerulescens* is due to another weevil, *Ceuthorrhynchus quadridens*, Panz., and to a flea-beetle, *Psylliodes chrysocephala*, L., but is distinct in character, for it rarely affects the actual roots, in which the larva of *B. coerulescens* mines. Oviposition by *B. coerulescens* probably begins early in spring. It is not certain that the root-collar is the place normally chosen for oviposition, as the larval mines often begin lower down the root. The larvae usually work in the pith downwards, but the

woody part of the root is also attacked. In the open the first pupae were seen in July and the last in August. The young adults appeared in September. Some of the females have been fertilised by early October, but oviposition does not occur until the spring.

ZACHER (—). **Mitteilungen über Vorratsschädlinge.** [Information about Pests of Stored Food-stuffs.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 79–90, 6 figs. [Received 13th March 1922.]

There is a danger of *Rhizopertha dominica*, F., becoming established in grain stores in Germany, though its need for warmth precludes it from being an out-door pest. The numerous insects that very seriously injured a large cargo of wheat from Argentina included *Latheticus oryzae*, Waterh., and *Palorus subdepressus*, Woll., which do not occur in Germany or only do so in isolated instances. *P. subdepressus* had done much damage, though no living specimens were seen, whereas living larvae and adults of *L. oryzae* were present. *Tinea misella*, Z., which occurs in peas, is believed to have two annual generations. The common bean Bruchid, *Bruchus* (*Bruchidius*) *obtectus*, Say, and another species, which may be *Spermophagus subfasciatus*, Boh., have also been introduced. It was found experimentally that *Calandra granaria*, L., can feed and develop on oats, contrary to findings by previous observers. Experiments in fumigation with hydrocyanic acid gas seem to show that weak strengths acting for a long time penetrate masses of grain better than higher concentrations used for a shorter time. Both *Ptinus fur*, L., and *Sitodrepa panicea*, L., can live in very dry and poisonous substances, a list of which is given for the latter beetle.

ZACHER (—). **Untersuchungen über Spinnmilben.** [Investigations on Spinning Mites.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 91–100. [Received 13th March 1922.]

The author justifies the nomenclature used in his previous papers and gives the synonymy of the names used by Hirst [*R. A. E.*, A, viii, 466]. Observations on the return migration of *Tetranychus telarius*, L., to foliage and on its oviposition are recorded. The list of 123 food-plants given in a preceding report [*R.A.E.*, A, ix, 139] is increased to 184. *T. telarius*, infesting shade trees, can be combated by applying trap-bands and thus capturing the winter females. Potato starch was used for spraying, instead of flour paste, and gave excellent results, but it must be more diluted.

ZACHER (—). **Mitteilungen über die Kiefern-Buschhornblattwespe und die Beendigung des Massenauftretens einiger Forstschädlinge durch die Witterung.** [Notes on *Diprion pini*, L., and the Termination of an Outbreak of some Forest Pests by the Weather.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 101–104, 2 figs. [Received 13th March 1922.]

From June to October 1919 a severe and extensive infestation of pines by the sawfly, *Diprion* (*Lophyrus*) *pini*, L., occurred near Potsdam. Experiments made with generators of arsenical vapours seem

to indicate that this method may be useful in depositing a film of arsenic on tall trees. The degree of toxicity attained did not seem sufficient to kill the older larvae in this instance. The sudden advent of frosty weather ended the infestation.

ZACHER (—) & WILKE (—). **Beobachtungen über Drahtwürmer und Lupinenfliege.** [Observations on Wireworms and the Lupin Fly.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 104–110, 4 figs. [Received 13th March 1922.]

Considerable damage was done in 1920 to potatoes at Köpernitz owing to infestation by *Agriotes obscurus*, L., and *Selatosomus aeneus*, L. Experiments with poison-baits for these wireworms showed little prospect of practical success; heavily poisoned baits were neglected, while those lightly poisoned did not seem to kill the larvae. Breaking up the soil in late summer to a depth of 6 in. is a measure commonly advised, but in August the older larvae were already at a depth of 8–12 in., probably owing to the light soil.

In the same locality young plants of lupin grown for manure were attacked in August by *Phorbia* (*Chortophila*) *trichodactyla*, Rond. This was the long sought for autumn generation of this fly, observations having hitherto been confined to the spring generation.

BÖRNER (—). **Ueber die Umwandlung von Wurzelrebläusen zu Blattrebläusen.** [The Transformation of the Root Vine-louse into the Leaf Vine-louse.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 163–167, 3 figs. [Received 13th March 1922.]

In 1908 Foa and Grassi observed a spontaneous transformation of root forms of the vine-louse [*Phylloxera*] into aerial forms. The author tried to effect this change by reproducing the conditions attending the Italian investigations, and was successful after a first unsatisfactory attempt. Though an exact determination could not be made, the Aphids that transformed appeared to be the *pervastatrix* form. The method used was as follows: A well-pruned pot vine was placed under a glass cover in a greenhouse, and the densely infested roots from another pot vine were laid on the soil in the pot. Care was taken to allow the foliage to develop in the manner peculiar to shaded plants. Most of the Aphids on the exposed roots sought refuge in the soil, but some remained on the exposed roots and oviposited there. Some young Aphids, however, migrated to the foliage and produced galls on it. The eggs of these gave rise to young with the biological and structural characters of the leaf form in all important respects. This method provides an easy means for investigating the races of *Phylloxera* that occur in the infested regions of Germany.

BÖRNER (—) & THIEM (—). **Neuere Mittel zur Reblausbekämpfung.** [New Methods for Combating the Vine-louse.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, pp. 167–182. [Received 13th March 1922.]

Investigations of the method for destroying *Phylloxera* by means of Ergethan (a tetrachlorethane cake insecticide that has been used

on a large scale) showed it to be very much inferior to carbon bisulphide. Sulfoergethan, which aims at destroying the pests without injuring the vines, also proved unsatisfactory, but the composition and method of application of the latter have been modified, and further tests are being made.

BLUNCK (—). **Ueber den Massenwechsel des grossen Kohlweisslings bei Hamburg.** [On the varying Abundance of *Pieris brassicae*, L., around Hamburg.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch, Berlin,* no. 21, pp. 182–184. [Received 13th March 1922.]

Even after a year in which the caterpillars had been abundant the spring generation of *Pieris brassicae*, L., was scanty around Hamburg. This was due less to unfavourable climatic conditions than to destruction by natural enemies, which begins with infestation by *Apanteles glomeratus*, often helped by *Polynema ovulorum* and *Pteromalus puparum*, and is continued by innumerable birds.

BLUNCK (—). **Bekämpfung der Kohlblattlaus mit Spiritusseifenwasser und Venetan.** [Combating the Cabbage Aphis with Alcohol-soap and with Venetan.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 185–186. [Received 13th March 1922.]

A spray containing 3 parts white soft soap and 5–6 parts of methylated spirit in 91–92 parts water has proved very satisfactory against cabbage aphis [*Brevicoryne brassicae*], attacking cabbages, and did no harm to the plants. With a better quality of soap, 1½ parts each of soap and spirit gave equally good results.

BLUNCK (—). **Hederich- und Rapsglanzkäfer,** *Meligethes viridescens*, **F., und** *aeneus*, **L.** [The Radish and Rape Beetles.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 187–189. [Received 13th March 1922.]

Meligethes viridescens, F., hitherto considered to have a similar life-history to that of *M. aeneus*, L., differs in some respects. In Germany it occurs chiefly on *Raphanus* spp., whereas *M. aeneus* occurs on *Raphanus*, *Sinapis* and *Brassica* indifferently.

SPEYER (—). **Der Kohlblattrüssler** (*Ceuthorrhynchus leprieuri* **a.** *rübsaameni*, **Kolbe).** [The Cabbage Leaf Weevil.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin,* no. 21, December 1921, pp. 189–194, 3 figs. [Received 13th March 1922.]

In Thuringia in spring and autumn the leaves of rape and turnip are infested with galls due to oviposition by *Ceuthorrhynchus rübsaameni*, Kolbe. The adults appear in mid-August and oviposit between September and April, with a break in winter, during which they shelter in hedges or among the fallen leaves in woods. Most of them die in April. The larvae feed on the gall-tissues and bore into the leaf-stems. They pupate in an earthen cell in the ground. After emerging in June the young adults aestivate in hedges and woods. The females require a further feeding period before oviposition. Frosty weather kills many of the larvae, while a parasite,

Diospilus oleraceus, Hal., destroys large numbers. The injury done by *C. rübsaameni* is negligible and is far outweighed by its value as a host of *D. oleraceus*, which is an important enemy of *Meligethes aeneus* [*R.A.E.*, A, ix, 549].

BÖRNER (—). **Die Brutpflanzen der Kohlblattlaus.** [The Food-plants of *Brevicoryne brassicae*, L.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 194–195. [Received 13th March 1922.]

Brevicoryne brassicae, L. (cabbage aphis) occurs on and injures a number of Cruciferae belonging to the genera *Diplotaxis*, *Erucastrum*, *Brassica*, *Sinapis*, *Eruca*, *Raphanus*, *Rapistrum*, *Myagrum* and *Crambe*. Lists of occasional food-plants, and of plants immune from infestation, are given.

BÖRNER (—). **Weitere Mitteilungen über Blattlauswanderungen.** [Further Notes on Aphid Migrations.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 195–200, 2 figs. [Received 13th March 1922.]

Further notes on the migrations of Aphids in Germany are given [*R.A.E.*, A, ix, 137]. The migratory forms of *Aphis viburnicola*, C.B., breed on *Typha latifolia*. Sexual individuals of *A. nymphaeae*, L., were found in autumn on wild plum. The stem-mothers and their offspring occur in spring on the shoots of apricot. This Aphid was not noticed on plum or peach growing near apricot. *Myzus similis*, v. d. G., produces winged sexual forms in autumn. Its transference from *Tussilago* to *Hippophaë* was successfully effected, and later on its return migration was observed. Its migratory forms will not feed on *Cirsium* spp., on which plant a non-migratory species, *Myzus carduinus*, Wlk., occurs. Sexual forms of *Brachycaudus cardui*, L., were successfully transferred to plum, and the resulting eggs gave rise in spring to stem-mothers that had a numerous progeny of quite typical *Brachycaudus pruni*, Koch. The migratory individuals of this brood established themselves on various plants, including *Carduus*. *B. cardui* is thus only a phase in the cycle of *B. pruni*.

The author is inclined to treat as distinct species the various black Aphids, *Aphis papaveris*, L. (*euonymi*, F.), *A. viburni*, Scop., and *A. rumicis*, L., and further provisionally describes a new species, *A. philadelphi*, which lives on *Philadelphus*, and is transferable to *Euonymus*, *Viburnum*, and various weeds. He discusses his views on this complicated problem in some detail.

SPEYER (—). **Beiträge zur Biologie der Kohlschotenmücke** (*Dasyneura brassicae*, **Winn.**). [Contributions to the Biology of the Pod Midge, *D. brassicae*.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, pp. 208–217, 7 figs. [Received 13th March 1922.]

In 1919 and 1920 the Naumburg branch of the Imperial Biological Institute received rape-pods infested with the larvae of a midge, *Perrisia* (*Dasyneura*) *brassicae*, Winn., and of a weevil, *Ceuthorrhynchus assimilis*, Payk. A premature yellowing, chiefly found at the places where the midge larvae are sucking, is the chief sign of injury by *P. brassicae*. The adults, which are destroyed in large numbers by

rain, oviposit repeatedly in the punctures due to *C. assimilis* and allied weevils, the ovipositor of the midge being inadequate to penetrate the undamaged shell of the pod. The period required from oviposition to larval maturity is about four weeks. Pupation in a soft cocoon covered with sand takes place in the ground at a depth of $\frac{1}{5}$–$3\frac{1}{2}$ in. The observed food-plants include rape, turnip, radish and mustard. There are several annual generations. Damp in conjunction with warmth, and the presence of *C. assimilis*, are factors favourable to increase of this midge. The larvae are attacked by fungi and by three Chalcids, and the eggs by a Proctotrupid, *Platygaster* sp.

THIEM (—). **Zur Bekämpfung des Schwammspinners.** [On the Control of *Porthetria dispar*.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 217–219. [Received 13th March 1922.]

Porthetria (*Lymantria*) *dispar* is common in the low-lying Vistula region south of Marienwerder in West Prussia. The measures adopted are the destruction of the eggs with petroleum and the collection of the larvae, pupae and adults.

SEELIGER (—). **Zur Frage der Pollenübertragung durch den Rapsglanzkäfer von botanischem Standpunkte.** [On the Question of Pollen Transference by *Meligethes aeneus* from the Botanical Point of View.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 224–229, 2 figs. [Received 13th March 1922.]

The conclusion reached is that *Meligethes aeneus*, F. (rape weevil) is probably beneficial in that it assists pollination.

WOLLENWEBER (—). **Beiträge zur Aelchenfauna der Kartoffel.** [Contributions on the Nematode Fauna of the Potato.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 21, December 1921, pp. 258–266. [Received 13th March 1922.]

This paper includes a description of a new Nematode, *Rhabditis cryptocercoides*, found in canker-infected potatoes from Bonn. Another species, *Atractonema gibbosum*, Leuck., parasitises the larvae of a fly, *Sciara* sp.

Versuche zur Bekämpfung der Oelfruchtschädlinge. [Experiments in the Control of Oil-crop Pests.]—*Mitt. Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, no. 22, December 1921, 49 pp. [Received 13th March 1922.]

Of the five reports in this publication two, by Dr. Lang and Dr. Rabbas, have already been noticed [*R.A.E.*, A, x, 254].

Drs. Börner, Blunck and Dyckerhoff have studied at Naumburg the action of a large number of insecticides on the rape beetle [*Meligethes aeneus*, F.] and on flea-beetles. The latter cannot fly well, so that when the direction of the wind has been constant for some time most of the individuals will be found at the lee-side of a field, where they remain until lack of food compels them to move against the wind. This must be taken into consideration in reckoning the value of remedial measures. Disappointing results were obtained with arsenicals against flea-beetles. On the other hand, a solution of 0·27 per cent. carbolic acid

proved satisfactory for reasons as yet unexplained. Infestation was slight, and the growth of the plants was rapid. A tobacco spray containing 0·14 per cent. nicotine proved more poisonous than any other spray tried, and further investigation is advisable, as nicotine appears to act as a respiration poison on these beetles. Lime-sulphur dust, naphthaline dust and turpentine gave good results on a small scale, but need further testing. Soot, ashes, sawdust, horse dung and road dust are efficacious on small plots if used in abundance. Their value seems to lie in hindering feeding.

Dr. Grosser describes an apparatus consisting of two inclined boards, each twelve feet long and covered with an adhesive, mounted on three wheels and drawn by a horse. Almost all the beetles caught with this were *M. aeneus*, and while the infestation by this species was originally very alarming, the crop ultimately proved a fair one. Spraying with arsenicals, including Urania green, do not appear to be of use against *M. aeneus*.

MORSTATT (H.). **Bibliographie der Pflanzenschutzliteratur. Die Jahre 1914–1919.** [A Bibliography of the Plant Protection Literature, 1914–1919.]—*Biol. Reichsanst. Land- u. Forstwirtsch., Berlin*, 1921, viii + 463 pp. [Received 13th March 1922.]

Though issued at a later date, this volume precedes chronologically the one for 1920 already noticed [*R.A.E.*, A, ix, 445].

MANGIN (M.). **Une grande Invasion de Nonne :** *Lymantria monacha* **dans les Forêts de Tchéco-Slovaquie.**—*Bull. Soc. Path. Vég. France, Paris*, viii, no. 4, October–December 1921, pp. 140–144. [Received 13th March 1922.]

A serious infestation of the nun moth, *Liparis* (*Lymantria*) *monacha*, was recently observed in Czecho-Slovakia. In Moravia, invasions of this moth seem to be confined to certain foci, where energetic measures, generally consisting of isolating ditches round the infested spots, succeed in localising the outbreaks. Slovakia is at present apparently immune, but in Bohemia the ravages of the moth are very serious, certain heavy forest stands being almost entirely exterminated. Both leafy and coniferous trees are attacked, though the former can often put out fresh foliage, and are therefore less severely injured. The depredations of *L. monacha* are aggravated wherever German methods of forest culture are adopted, that is, pure stands thickly planted and badly ventilated; in the mixed leafy and coniferous woods, carefully ventilated and regenerated in the French fashion, the effects are much less deadly and do not entail wholesale felling. The exceptional drought of 1921 undoubtedly aggravated the nun moth attacks, especially in stands of Norwegian pine or larch.

The trees that suffer most from *L. monacha* are pines and other native conifers, birch, oak, beech, hornbeam, alder and apple. Limes and pear trees have also been found infested. In badly infested places, ash, elm and *Pseudotsuga douglasi* have remained immune. The depredations of the nun moth began three years ago in Bohemia, and seem to have reached their maximum in 1921; it is hoped that the numbers will speedily be reduced by the infectious polyhedral and flacherie diseases.

The only measures that can be considered successful are all expensive. They include the isolation of large areas by means of a trench around the points of attack, and the application of tanglefoot on the trunks.

These two measures employed simultaneously have given excellent results where infestations were beginning; and where they were already severe, thousands of larvae have been caught in the trenches while trying to escape from the banded area, and are there easily destroyed by insecticides. Lead arsenate sprays have been successful in nurseries and young plantations. An apparently successful attempt has been made to propagate artificially the diseases mentioned above.

L. monacha is recorded as occurring normally in most of the districts of France, but, although a somewhat serious infestation occurred in Belgium two years ago, there has never been a severe outbreak in France. It is quite possible, however, that such an invasion might occur at any time, particularly during periods of heavy infestations in other parts of Europe, and it is thought that it would be advisable to prohibit for a time the importation of timber from Czecho-Slovakia.

In 1921 also, the Pyralid, *Phlyctaenodes sticticalis*, was a menace to the beet crop that is grown to supply the important sugar industry of Czecho-Slovakia. In some districts this moth was so numerous as to attack not only the beets but also the neighbouring fields and the edges of the forests, in which the needles of all the coniferous trees were eaten, except those of *Pinus austriaca*.

MIÈGE (E.). **Sur une Invasion des Céréales au Maroc par la** *Sesamia nonagrioides*.—*Bull. Soc. Path. Vég. France, Paris*, viii, no. 4, October–December 1921, pp. 145–147. [Received 13th March 1922.]

Sesamia vuteria (*nonagrioides*), which has occasionally been reported as damaging sugar-cane in Morocco, was found in abundance in 1920 on maize and sorghum, which are important crops in that country; while in 1921, wheat and oats in the Experiment Station at Rabat were infested, particularly the hard varieties (*Triticum durum*), though barley growing in adjacent plots was untouched. An entrance is effected just below a node, and the larva works upwards, traversing the various nodes, but generally stopping at the middle of the highest internode, about 8 in. below the base of the head. The larvae develop much more successfully in solid-stemmed varieties. The infestation of these grain crops seems to be to some extent accidental, and the moth has not yet become perfectly adapted to them, for the majority of the larvae die in the stubble before completing their development, presumably largely from insufficiency of nourishment, as well as owing to the high degree of parasitism by various unidentified enemies. The damage done to grain has, however, amounted in some cases to as much as 25 per cent. of the crop.

MARCHAL (P.) & FOEX (E.). **Rapport Phytopathologique pour les Années 1919-1920.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. i–lxxxvii. [Received 15th March 1922.]

The organisation of agricultural work under the Service des Epiphyties is reviewed. The larvae of *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) increased to such an extent in 1919 and 1920 that compulsory destruction of the nests was instituted. This, however, was not rigorously carried out, and it was found better to depend chiefly on the collection of nests, for which a certain payment was made. The Botanical Gardens of Orleans collected in this way 2,183,000 nests in the course of their campaign.

Pests of cereals reported from various districts include *Pyrausta nubilalis*, Hb., which attacks maize, hemp, millet, hops and *Artemisia*. Grain crops have suffered largely from the attacks of cutworms. Other cereal pests were *Sitotroga cerealella*; Elaterid larvae infesting wheat and oats; *Lema melanopa*, which is spreading over new areas; the Cecidomyiids, *Mayetiola destructor* (Hessian fly) and *Contarinia* (*Diplosis*) *tritici*; and the Aphids, *Eriosoma* (*Schizoneura*) *venustum*, *Tetraneura ulmi*, the sexual form of which lives on elm, *Forda trivialis* and *F. marginata*, which apparently winter on the roots of wild Gramineae, and *Paracletus cimiciformis*.

Forage and pasture crops suffered from *Colaspidema atrum*, *Hypera* (*Phytonomus*) *variabilis* and *Lycaena icarus*, which especially attack lucerne, while the mountain pastures of the central plateau have been badly infested with *Psyche atra*. Beets and potatoes were damaged by *Silpha opaca*, *Agrotis*, *Aphis rumicis*, *Melolontha melolontha* (*vulgaris*), *Bothynoderes* (*Cleonus*) *punctiventris* and *Conorrhynchus* (*C.*) *mendicus*.

Vegetables suffered less than in previous years from *Pieris*, natural enemies, *Apanteles glomeratus*, *Pteromalus larvarum* and *Voria* sp., having served to keep these butterflies in check. *Barathra* (*Mamestra*) *brassicae* was very abundant in 1919, but much less so in 1920, apparently owing largely to a Trichogrammid parasite. *Gryllotalpa gryllotalpa* (*vulgaris*), Elaterid larvae (particularly those of *Corymbites latus*), *Meligethes aeneus*, *Cassida viridis*, *Baris cuprirostris*, and, to a less extent, *B. chlorizans*, a root Aphid of the genus *Trama*, *Platyparaea poeciloptera* (asparagus fly), *Agromyza abiens* (artichoke fly), *Depressaria subpropinquella*, which is increasing on artichokes, and larvae of *Athalia colibri* (*spinarum*) on turnips and cabbages, have all been recorded as injurious in various localities.

Fruit-tree pests include *Cheimatobia brumata* and *Hibernia defoliaria* on stone fruits; *Hyponomeuta malinellus* on apples and *H. padellus* on plums; *Cydia* (*Carpocapsa*) *pomonella*; *Nygmia phaeorrhoea*, which was a very serious pest of fruit-trees as well as forest trees; *Malacosoma neustria*; *Aporia crataegi*, especially abundant on young nursery trees; the larva of *Eupithecia rectangulata*, which destroys apple blossoms; larvae of the Noctuid, *Episema* (*Diloba*) *caeruleocephala*, and of the Zygaenid, *Aglaope infausta*, which were very injurious to almond trees; *Scolytus rugulosus* on apricots; *Anthonomus pomorum*, which caused heavy losses to the apple crop in some districts; the bud weevils, *Rhynchites conicus*, *Phyllobius pyri*, *P. oblongus* and *P. argenteus*; *Rhynchites cupreus* on cherries; *R. bacchus* on apples; larvae of the sawflies, *Hoplocampa brevis* and *H. testudinea* (?), on pears and apples; *H. fulvicornis* on plums; *Eriocampoides limacina*, very abundant on pears and cherries; *Neurotoma* (*Lyda*) *nemoralis*, causing defoliation of peach trees; and *N. flaviventris* on pears. *Ceratitis capitata* (Mediterranean fruit-fly) has evidently become established in France, where it infests peach and apricot trees, but it is thought that the climate is too rigorous for it ever to become a very important pest. *Eriosoma lanigerum* (woolly apple aphis) was very abundant in the spring of 1920 in many districts, but finally almost disappeared owing to the activities of its enemies. Further introductions of *Aphelinus mali* as a means of controlling this pest are to be made.

The two chief vine pests, *Clysia ambiguella* and *Polychrosis botrana*, and the methods adopted for their suppression have been noticed in various earlier papers. Severe local attacks of the Pyralid, *Sparganothis*

(*Oenophthira*) *pilleriana*, are recorded, and the efficacy of hot-water treatment when thoroughly carried out is discussed [*R. A.E.*, A, viii, 39]. Other vine pests recorded are the Sphingid, *Deilephila livornica*; larvae of *Agrotis* and other cutworms; *Byctiscus betulae* (*Rhynchites betuleti*) (vine leaf-roller); *Tanymecus palliatus*; *Opatrum sabulosum*; and *Helops* sp. on grafted vines in sandy soils. The question of *Phylloxera* infestation, which was serious in 1919 and 1920, and the influence of grafted foreign stocks are briefly discussed.

Forest trees suffered chiefly from attacks of *Porthetria* (*Lymantria*) *dispar*, while *Galerucella luteola* and *Agelastica alni* were more numerous than usual, and *Lophyrus* spp. damaged pine trees in one district.

Olives were attacked by *Dacus oleae* (olive fly), *Prays oleellus*, *Phloeothrips oleae* and the black scale, *Saissetia* (*Lecanium*) *oleae*. *Citrus* spp. were infested by *Chrysomphalus dictyospermi pinnulifera* (*minor*) and *Pseudococcus citri*, against which colonies of the Australian Coccinellid, *Cryptolaemus montrouzieri* have been introduced. *Diaspis pentagona* only occurs locally. *Ceroplastes sinensis* was numerous on *Citrus* spp. in 1919 and proved very difficult to deal with; *C. rusci* caused much damage to figs, the leaves of which were attacked by the larvae of *Hemerophila* (*Simaethis*) *nemorana*. The presence of *Iridomyrmex humilis* (Argentine ant) indicates possible trouble in the future from increasing numbers of *Icerya purchasi*.

Ornamental plants were attacked by *Perrisia affinis*, Kieff. (the Cecidomyiid infesting the violet), *Stephanitis rhododendri*, Horv., which can be successfully treated by nicotine sprays soon after hatching of the eggs, which are located in the veins of the leaves, and *Otiorrhynchus meridionalis*, found particularly on *Hedera grandifolia*.

PAILLOT (A.). **Les Traitements simultanés contre les Maladies cryptogamiques et les Insectes Parasites des Arbres Fruitiers par les Bouillies mixtes.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 169–194, 2 plates. [Received 15th March 1922.]

As a result of a number of tests made with various formulae for the purpose of determining the relative efficacy of copper sprays compared with arsenical lime-sulphur mixtures, the conclusion is reached that the latter are decidedly cheaper. Unfortunately the growers have used the copper mixtures as fungicides for so many years that they cannot be induced readily to adopt new formulae, and constant demonstration of their value is necessary. It is hoped that the manufacture of polysulphides may be taken up in France on a scale that will enable them to compete with foreign brands. The mixtures that are recommended for preference are very similar to those advocated by Feytaud [*R. A.E.*, A, x, 220]. The Bordeaux and lead arsenate mixture must not, however, be used during the blossoming period, but must then be replaced either by a lead arsenate spray without copper or by a mixture of liver of sulphur and calcium arsenate prepared by mixing 3 lb. liver of sulphur, 3 lb. dry calcium arsenate and 30 lb. powdered hydrated fat lime with 100 gals. of water.

Three treatments are recommended for apple and pear trees against the spring pests. These should be given firstly before blossoming, but when the buds have begun to burst; secondly, after blossoming, when the petals begin to fall; and, thirdly, a fortnight later, when the fruit is all well formed. The last two treatments, which are largely against *Cydia pomonella*, should always be given at the exact time

indicated. The first treatment may be made earlier if there is no danger of infestation by *Cheimatobia*, and can then coincide with the treatment of peaches against fungi. The same copper mixture, without the arsenate, can be used for both kinds of trees. When apples only are to be treated, the last two sprays are generally sufficient, unless *Cheimatobia* is likely to be present, in which case a first treatment should be given before blossoming. Various instructions as to the best method of spraying are given, with a description of suitable apparatus.

FEYTAUD (J.). **Essais de Bouillies mixtes pour le Traitement des Arbres Fruitiers.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 195–236, 5 figs. [Received 15th March 1922.]

The advantages accruing from the use of mixed sprays for combating insect pests and diseases of fruit-trees, and the substances recommended for this purpose, have been discussed in another paper [*R.A.E.*, A, x, 220].

CHOPARD (L.). **La Fourmi d'Argentine,** *Iridomyrmex humilis* **var.** *arrogans*, **Santschi, dans le Midi de la France.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 237–266, 33 figs. [Received 15th March 1922.]

The life-history and habits of *Iridomyrmex humilis* (Argentine ant) as occurring in France are summarised, and a full account is given of measures that have proved successful against it [*R.A.E.*, A, ix, 251].

FEYTAUD (J.). **Recherches sur l'Eudémis et la Cochylis dans le Bordelais en 1918 et 1919.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 323–338. [Received 15th March 1922.]

Weather conditions and their influence on the seasonal incidence of the vine moths [*Clysia ambiguella* and *Polychrosis botrana*] in 1918 and 1919 are discussed. A moderate temperature, ranging between 60 and 64° F., with some humidity, seems to present optimum conditions for *C. ambiguella*; higher temperatures, of 68° F. and over, accompanied by dryness are unfavourable to it. The normal heat and dryness of the Bordeaux region are frequently fatal to the insect, which only survives in the cooler districts. This summer mortality affects the older larvae of the first generation, the adults, and the eggs and young larvae of the second generation. *P. botrana* is much less influenced by temperature and humidity conditions, and seems to thrive best in full summer in normal years. This preference for heat, together with a high winter mortality, renders the summer generation more numerous than the spring one, and produces a more regular incidence curve than that of *C. ambiguella*.

VAYSSIÈRE (P.). **Les Insectes nuisibles aux Cultures du Maroc.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 339–370, 8 plates. [Received 15th March 1922.]

An account is given of insects injurious to the cultivated crops of Morocco [*R.A.E.*, A, viii, 121; ix, 57], with notes on some of the insecticides that have been recommended against them.

Régnier (R.). **La Station Entomologique de Rouen.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 371–376, 4 figs. [Received 15th March 1922.]

During the period under review, a fresh Station has been added to the Service des Epiphyties, situated at Rouen. This will replace the Laboratory of Agricultural Entomology, directed by the late Paul Noel. A brief review of the work done by this Laboratory during the thirty years of its existence is given, with a description of various traps designed for the capture of insects that have been used with success.

Régnier (R.). **Un Ennemi du Peuplier:** *Idiocerus populi* **(Linné) Flor (Homop.) ou Cicadelle du Peuplier.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 377–385, 10 figs. [Received 15th March 1922.]

The leaf-hopper, *Idiocerus populi*, L., has been the subject of study during recent years, as it has done considerable damage to poplars, which are among the most valuable trees in France. All stages of the insect are described. The eggs are deposited during the summer in a slit made by the female that penetrates to the pith of the lateral branches of the current year's growth. The eggs rarely number more than five and remain in hibernation until April, when the nymphs appear and subsist at first on the gum exuding from the leaf-buds. In later stages they suck the sap from the leaves, causing them to wilt, and finally attack the stems. Adults appear about six weeks after the hatching of the eggs, generally about the end of May. They are frequently found on grasses, as well as on the trees; they choose for preference young trees at the edges of nurseries or new plantations, moving from tree to tree but seldom passing from one plantation to another.

Besides their direct attack on the trees, these leaf-hoppers are even more dangerous as potential disseminators of the bacterial canker caused by *Micrococcus populi*. Whether the leaf-hoppers actually inoculate the disease into a healthy tree after feeding upon an infected one is not yet known, but the slits made by the female for oviposition cause a gummy secretion at the wound, in which *M. populi* finds a very favourable medium for development.

As the chief point of attack of *Idiocerus populi* is the lateral branches, a very simple method of destroying the insect is to lop off these, and, as this is done in the winter, the branches need not even be burnt, but can be tied up in bundles and left to dry, when the eggs will be destroyed by desiccation of the tissues. Birds, spiders, and an unidentified Acarid that has been found attached to the thorax of *I. populi*, reduce the numbers of leaf-hoppers considerably. Hymenopterous parasites were obtained in rearing cages, which are evidently Mymarids of the genus *Gonatocerus* and are closely allied to *G. maga*, Gir.

I. scurra, found also on poplar, has a very similar life-history to that of *I. populi*.

Régnier (R.). **La Question des Corbeaux en Normandie.**—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 386–390. [Received 15th March 1922.]

Crows and rooks have been increasing in Normandy to an alarming extent during the last few years, largely, it is thought, owing to conditions during the war. Although these birds are of some benefit in

destroying a certain number of insect larvae, these do not furnish anything like the bulk of their nourishment, and the crops suffer largely in consequence. Many suggestions are given for making the law of 1907, which declared crows to be noxious birds, an effective and adequate measure for the farmers' protection, and it is hoped that these suggestions will shortly be embodied in a ministerial decree.

POUTIERS (R.) & TURINETTI (L.). **Observations biologiques sur la Mouche des Olives et ses Parasites, dans la Région de Menton.**—*Ann. Epiphyties, Paris,* vii (1919 & 1920), 1921, pp. 391–397. [Received 15th March 1922.]

The seasonal incidence of *Dacus oleae* (olive fly) on the Mediterranean Coast is discussed, and shows considerable variation, for there are only two or three generations in the mountainous districts, while four or even five occur at Mentone. Indigenous parasites reared from *D. oleae* are the Chalcids, *Eulophus longulus*, Zett., *Eupelmus urozonus*, Dalm., and *Eurytoma rosae*, Nees. Of these, the first-named is by far the most numerous. These Hymenoptera are, however, polyphagous, and live, from the beginning of October, at the expense of other insects. *D. oleae* continues to breed throughout October and November, and larvae continue to mine the fruit even in December. An attempt was therefore made to introduce from Tunis the parasite, *Opius concolor*, Silv., which is exclusive to the olive fly. Its establishment has failed up to the present, but a further effort will be made to introduce it.

Remedial measures in use in Italy and France are reviewed [*R.A.E.*, A, ix, 110; x, 67, etc.]. As the olive trees in Mentone and the Maritime Alps grow very tall, powerful pumps are required for spraying, and the trees should be well pruned to facilitate this treatment.

The advisability of raising the prohibition against the use of soluble arsenical salts, and also the importance of forming syndicates for combating this pest, as in the Italian provinces, are pointed out.

TROUVELOT (B.). **Recherches sur l'Emploi de la Chloropicrine comme Insecticide agricole.**—*Ann. Epiphyties, Paris,* vii (1919 & 1920), 1921, pp. 398–404. [Received 15th March 1922.]

A number of tests have been made to determine the value of chloropicrin as a remedy for certain insect pests, and its effect on various plants. Larvae of *Nygmia phaeorrhoea*, Don. (*Liparis chrysorrhaea*), treated during the winter in their nests, were all killed by even a weak dose acting for a short time. As chloropicrin has given good results with many trees (such as apple, wild quince and myrobolan plum) when treated during their dormant period, it is thought that this method might well be used on a commercial scale against the nests of *N. phaeorrhoea*.

Against Coccids the results are much less satisfactory. *Diaspis pentagona* on jasmine is not destroyed with certainty by a dose of ⅓ oz. of the fumigant used for one hour, or even by double that strength for 1½ hours; while young rooted cuttings are affected by even half of the weaker dose. *Coccus* (*Lecanium*) *hesperidum* on oranges also proved very resistant to fumigation. *Ceroplastes rusci* was more easily destroyed, but the susceptibility of its food-plants was very variable. Oranges and figs were unaffected by the fumigant, but camellias and roses proved very susceptible.

Rapports sommaires sur les Travaux accomplis dans les Laboratoires et Comptes rendus des Missions d'Etudes.—*Ann. Epiphyties, Paris*, vii (1919 & 1920), 1921, pp. 421–441. [Received 15th March 1922.]

The work of the entomological and pathological stations at Paris, Mentone, Blois, Bordeaux, Montpellier, Saint-Genis-Laval and Rouen are reviewed, much of the work recorded having been noticed in detail in previous papers of this series. The Coccinellid, *Cryptolaemus montrouzieri*, introduced from Australia [*R.A.E.*, A, ix, 28], has become successfully established and has produced a marked reduction in the numbers of *Pseudococcus citri*. The introduction of *Aphelinus mali* against *Eriosoma lanigerum* [*R. A.E.*, A, ix, 476, 593, etc.] is described. Attempts are being made to preserve the Hymenopterous parasites of *Phthorimaea operculella*, introduced from America, by feeding them on a collection of larvae of their host.

A recent visit of M. Vayssière to Morocco to study the question of a disease of date palms has elicited the fact that *Oryctes grypus*, said to be the cause of the disease, plays only a secondary rôle, the disease not being primarily due to any insect pest.

At Mentone, the rearing of *Novius cardinalis* has been continued, and colonies are being distributed wherever *Icerya purchasi* is abundant. Attempts are also being made to introduce the Coccinellid, *Hippodamia convergens*, from California as a means of reducing the numbers of various Aphids.

At Blois a study has been made of Aphids, of which many injurious species occur. Several species of *Forda* and *Pentaphis*, *Paracletus cimiciformis*, Heyd., and *Tychea setulosa*, Pass., living on the roots of cereals, are incompletely understood and require further study. A Pemphigid, *Hamamelistes betulae*, Mordv., found on white birch, has only three generations in a year, and seems to reproduce indefinitely by parthenogenesis. The two summer generations, the first wingless, the second composed of both winged and wingless individuals, are found from late March to mid-June. The winter generation, appearing at the end of May or June, lives as a larva in a dormant condition on the shoots of birch and matures in the following spring, when reproduction continues. No sexual form has as yet been observed. The species seems to be distinctly limited to a few localities, and as it has been found near greenhouses it is questioned whether there may be, every two, three, four or five years, a return to some greenhouse plant where the sexuales live and the stem-mothers hatch from the winter egg. It is hoped to determine this point by transporting some of the insects on to trees far removed from greenhouses. It is hoped to rear shortly the hitherto unknown sexuales of *Vacuna dryophila*, Schr., which lives on the tips of oak, and of *Glyphina betulae*, Koch, developing on white birch. The genus *Asiphum* has apparently been represented hitherto by only one species, namely, *A. tremulae*, DeG., living on *Populus tremula*; in 1919 a new species was found on *P. alba*, and will shortly be described.

Cydia (*Laspeyresia*) *conicolana*, a Microlepidopteron new to France, has been found injuring Salzmann pine in Hérault, where the Curculionid, *Tanymecus palliatus*, has caused serious damage to vines by cutting off the buds in April and May. The Pierid, *Aporia crataegi* was also very abundant on young fruit-trees. Larvae were observed about 27th May and fed in groups on the leaves, constructing

nests in which they lived. The larvae hibernate and are largely parasitised by a Tachinid and by the Braconids, *Apanteles glomeratus* and *A. spurius*.

Apricot trees in the Rhône valley have been killed in many cases by *Scolytus rugulosus*, while peaches have suffered from the attacks of *Neurotoma nemoralis*. Against the former, various formulae for sticky washes and sprays were tried without success; it is considered the best plan to cut down in spring all branches that show wilted leaves and burn them at once. This is not difficult, as the infestation is never widespread. Cherry trees were also sometimes attacked, but peaches were never affected.

Pyrausta nubilalis, Hb. (European corn-borer) has done considerable damage to maize in the south-west of France. It was noticed that many of the galleries had been opened by birds and the larvae extracted. From 15 larvae examined, two Ichneumonids (*Limneria albida*) were obtained, and four Tachinids (*Paraphorocera senilis* and *Zenillia roseanae*).

PRIESNER (H.). *Haplothrips*-**Studien.**—*Treubia, Buitenzorg*, ii, no. 1, December 1921, pp. 1–20, 7 figs.

The first section of this paper deals with the species of *Haplothrips* from Ceylon and Dutch East Indies, including *H. ceylonicus*, Schmutz, var. *vernoniae*, nov., from leaves of *Vernonia cinerea*, and *H. inquilinus*, sp. n., from leaf-galls on *Ficus benjamina* and *Smilax* sp., and a key is given to the species concerned. In the second part there is a key to the European species, with descriptions of several of them. The third portion describes two new genera from Java, *Trichaplothrips* and *Glenothrips*.

KARNY (H. H.). **Ergaenzung zu Priesner's "*Haplothrips*-Studien": Die Australischen Haplothripinen.** [A Supplement to Priesner's Paper "Studies on *Haplothrips*": The HAPLOTHRIPINAE of Australia.]—*Treubia, Buitenzorg*, ii, no. 1, December 1921, pp. 21–36, 1 fig.

Full descriptions are given of a number of species from the Mjöberg expedition, of which only brief notices have been published.

KARNY (H. H.). **Beitraege zur Malayischen Thysanopterenfauna. IV–V.** [Contributions to the Malayan Thysanopterous Fauna. IV–V.]—*Treubia, Buitenzorg*, ii, no. 1, December 1921, pp. 37–83, 25 figs.

This paper includes descriptions of *Agnostochthona curvidens*, sp. n., and *Machatothrips heveae*, sp. n., on *Hevea*. The new species from tea are *Bregmatothrips theifloris*, which lives in the blossoms and may be useful as a pollen carrier; and *Anaphothrips theiperdus*, *A. theivorus* and *A. theifolii*, which cause a longitudinal rolling of the leaf, in which *Haplothrips inquinatus*, sp. n., is a tenant. *A. theifolii* seems to be the least harmful of the three. The only measure consists in plucking and burning the infested leaves.

FELT (E. P.). **New Japanese Gall Midges.**—*Treubia, Buitenzorg,* ii, no. 1, December 1921, pp. 89–92.

The species described include *Thorodiplosis impatientis,* gen. et sp. n., from a leaf-gall on *Impatiens platypetala,* and *Parallelodiplosis javanica* on *Panicum indicum.*

NALEPA (A.). **Eriophyiden aus Java. (3. Beitrag.)** [Eriophyidae from Java. Third Contribution.]—*Treubia, Buitenzorg,* ii, no. 1, December 1921, pp. 146–153.

Descriptions are given of four new species of *Eriophyes,* one of *Phytoptochetus* and one of *Phyllocoptes.* Lists are given, one of the galls arranged according to the plant orders and another of the mites concerned.

DA COSTA LIMA (A.). **Nota sobre os Insectos que atacam o Algodoeiro no Brasil.** [Note on the Insect Pests of Cotton in Brazil.]—*Chacaras e Quintaes, S. Paulo,* xxv, no. 2, 15th February 1922, pp. 110–112, 5 figs.

The Brazilian cotton pests enumerated in this paper are: the Lepidoptera, *Alabama argillacea,* Hb., *Heliothis obsoleta,* F., *Ephestia cautella,* Wlk., *Platyedra gossypiella,* Saund., *Pyroderces rileyi,* Wlsm; the Coleoptera, *Gasterocercodes gossypii,* Pierce, *Araecerus fasciculatus,* DeG., *Spermophagus hoffmanseggi,* Boh.; an Aphid, *Aphis gossypii,* Glov.; the Coccids, *Saissetia depressa,* Targ., and *Hemichionaspis minor,* Mask.; a Pyrrhocorid bug, *Dysdercus ruficollis;* a Lygaeid bug, *Oxycarenus hyalipennis,* Costa; and a Tingid bug, *Gargaphia torresi,* sp. n., from Rio Grande do Norte.

HAVILAND (M. D.). **The Bionomics of certain Parasitic Hymenoptera.** —*Proc. Cambridge Philosoph. Soc., Cambridge,* xxi, pt. 1, 1921, pp. 27–28. [Received 14th March 1922.]

Aphids, with their parasites and hyperparasites, form a well-defined complex of considerable intricacy. Numerous species of Braconids are internal parasites of Aphids, and their larvae during development, are liable to infestation by certain Cynipids, Chalcids, and Proctotrupids, which are therefore hyperparasites of the Aphid.

The origin of primary parasitism is discussed. The successive infestations of a single host by two or more species, or by two or more individuals of the same species of parasite, is sometimes called superparasitism; but as this term means the same as hyperparasitism, which is applied to cases where the parasite is itself attacked by another parasite, the word epiparasitism is suggested to replace it; whilst metaparasitism is intended to designate what has so far been termed accidental superparasitism, *i.e.,* the direct attack of one epiparasite upon another. As these distinctions may be considered too subtle for new nomenclature, the author draws attention to the importance of ascertaining to what extent a parasite is potentially metaparasitic before it is introduced into fresh countries for the control of insect pests.

Tanganyika Territory: The Cotton Ordinance, 1920.—*Dar-es-Salaam,* no. 13, 15th December 1920, 9 pp. [Received 25th April 1922.]

These rules are to be cited as the Cotton Rules 1920. Cotton seed may only be imported with a licence and a certificate, and only at

certain places. The Director of Agriculture has power to requisition and distribute seed. No native shall grow cotton except from seed obtained from, or approved by, the Director. Plantations are to be kept free from weeds and grass, and diseases and pests are to be notified. Cotton plants shall be uprooted every season at a date to be fixed by the Director. Details are given of the regulations respecting cotton markets, the purchase of cotton at these markets or the buyer's premises, ginneries, and hand cotton gins, with the penalties to be inflicted for non-observance of them.

Imports and Exports Restriction Proclamation, 1920.—*Tanganyika Terr. Official Gaz., Dar-es-Salaam*, ii, no. 12, 16th May 1921. [Received 25th April 1922.]

Under the above proclamation, dated 16th May 1921, the importation of the following plants and seed is prohibited into Tanganyika Territory without the permission in writing of the Director of Agriculture: coffee plants, living or dead, coffee beans and coffee (except coffee beans intended for human consumption, roasted beans or ground coffee); the plants of any stone fruit or any portion thereof; apple and pear stocks; potato seed; and citrus trees or fruit (except citrus fruit grown in Zanzibar or Pemba).

Persons desirous of obtaining permits must state the name in full of the kind and variety of plant which it is desired to import, the name and address of the nursery or person who is to supply the plant, and the reasons thought to justify the granting of the permit required.

The Cotton Rules, 1920. Government Notice No. 31.—*Tanganyika Terr. Official Gaz., Dar-es-Salaam*, iii, no. 6, 10th February 1922.

Under Rule 14 of the Cotton Rules 1920, the 28th February 1922 has been fixed as the date before which all the previous season's cotton plants shall be uprooted and burned throughout Tanganyika Territory.

Service and Regulatory Announcements, January–June 1921.—*U.S. Dept. Agric., Washington, D.C.*, Fed. Hortic. Bd., no. 70, 23rd September 1921, 94 pp. [Received 14th March 1922.]

The situation with regard to the pink bollworm [*Platyedra gossypiella*] in Texas, Louisiana and New Mexico is discussed. Energetic measures, particularly in regard to the maintenance of non-cotton zones in infested districts, have done much to ameliorate the situation and the outlook is considered hopeful; but the failure of Texas to provide for such quarantine and remedial work as is considered adequate to hold the pest within its present limits in that State, and the abandonment of the enforcement of non-cotton zones, necessitate certain changes of policy in future campaigns. Experts working on the subject are convinced that if the States concerned give adequate support to the work there is a strong possibility of exterminating the pest and of freeing the country indefinitely from this menace to the cotton crop. The opportunity must, however, be seized at once, and the necessary remedial operations must be carried forward efficiently and without interruption for at least three years, or the money spent will be wasted and the opportunity for extermination will be lost altogether. The present status of the infested districts is discussed in detail.

Quarantine no. 37, respecting nursery stock, plants and seeds [R. A. E., A, vii, 184], remains unchanged, but the regulations in connection with it have been revised. The most important change is that in the case of nursery stock and other plants and seeds for which a permit is not required, these must be free from sand, soil or earth. With regard to the inspection previous to entry, inspection must be made at the time of packing of all nursery stock and other plants or seeds, and the certificate of inspection must include certification of packing materials and that the plants have been washed and are free from soil. A number of definitions have been added and a few unimportant verbal changes have been made in other regulations. The provisions of entry and the restrictions imposed are explained at length.

Quarantine no. 43, against the European corn-borer, *Pyrausta nubilalis* [R. A. E., A, viii, 511], is amended by Regulation no. 4, making inspection and certification a condition of movement from infested areas.

The situation with regard to the gipsy moth [*Porthetria dispar*] and the brown-tail moth [*Nygmia phaeorrhoea*] in the infested areas of New York, Pennsylvania and New Jersey, is discussed in detail. During 1920 there was a considerable spread westward of the gipsy moth, while there has been a reduction in the area infested by the brown-tail moth. In a regulation supplemental to Quarantine no. 45, of 1st July 1920, the areas designated as infested by *P. dispar* are enumerated, and the quarantine is extended to include 62 new towns. The town of Berlin, N.H., is eliminated from the quarantine.

The presence of *Epilachna corrupta*, Muls. (Mexican bean-beetle) in Alabama has made it necessary to quarantine that State, and under Quarantine no. 50 of 1st May 1921, numerous leguminous and other plants and plant products cannot be moved interstate, except under the conditions provided in the rules and regulations supplemental thereto.

A list of current quarantine and other restrictive orders is given.

Siegler (E. H.) & Plank (H. K.). **Life History of the Codling Moth in the Grand Valley of Colorado.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 932, 20th September 1921, 119 pp., 7 plates, 36 figs. [Received 14th March 1922.]

The life-history of *Cydia* (*Laspeyresia*) *pomonella*, L., as occurring in the Grand Valley of Colorado is described in great detail. The insects predacious on it are a beetle, *Tenebroides corticalis*, Melsh., and a spider, *Coriarachne versicolor*, Keys. Its parasites are *Trichogramma minutum*, Riley, *Dibrachys clisiocampae*, Fitch, and *Arthrolytus apatelae*, Ashm., but these natural enemies are unimportant as a means of checking it in the Grand Valley.

A portion of the authors' summary is as follows: The emergence of moths from fruit cellars is later than that in the field. The period of emergence in such cellars, however, is shorter than that which obtains under field conditions. The majority of the moths of the spring and first broods emerge during the latter part of the morning and early part of the afternoon. The codling moth is believed to be a non-migratory species except for short local flights. The moths have, however, sufficient strength to fly in a continuous flight, unaided by the wind, for a distance of at least half a mile. The female is most active in depositing her eggs late in the afternoon to early in the

evening, the activity being greatest just about dusk. The fecundity of the codling moth in the Grand Valley is high. Three female moths of the first brood deposited in confinement over 300 eggs each, the highest total deposition by one moth being 316 eggs and 115 being the largest number deposited in one day by a single female. An examination of a pear orchard devoid of fruit revealed the fact that the moth larvae will sometimes burrow into the new growth, resulting in the browning of the foliage. They prefer to spin up under dark-coloured bands.

The buff-coloured variety of the codling moth, known as *Cydia pomonella*, L., var. *simpsoni*, Busck, was reared in the Grand Valley.

The Insect Pest Survey Bulletin, Index to Vol. I, 1921.—*U.S. Dept. Agric.* [*Washington, D.C.*], 1921, 31 pp. [Received 15th March 1922.]

This index includes not only the scientific names of the insects mentioned in volume i, but also the popular names, with a cross reference to the technical name in each case. It is hoped that the popular names used by the survey will be accepted by all working entomologists and eventually be adopted by the American Association of Economic Entomologists.

Reinking (O. A.) & Groff (G. W.). **The Kao Pan seedless Siamese Pummelo and its Culture.**—*Philippine Jl. Sci., Manila*, xix, no. 4, October 1921, pp. 389–437, 16 plates, 1 fig. [Received 16th March 1922.]

The insects recorded as causing injury to the seedless Siamese pomelo are: the ants, *Pheidologeton* sp., which attacks and kills the roots just below the ground surface, and even the young twigs and leaves, and which may be controlled by flooding and burning, and *Oecophylla smaragdina*, F., which is common on the branches but does no direct injury, though it fosters scale-insects; flea-beetles, causing serious injury to the foliage; and a moth, *Phyllocnistis citrella*, Staint., which especially attacks young nursery trees and also occurs on various species of *Loranthus*.

Scale-insects occur in abundance on the stems, leaves and fruit. They include *Chrysomphalus aonidum*, L., *C. aurantii*, Mask., *Coccus hesperidum*, L., *Lepidosaphes gloveri*, Pack., *Parlatoria brasiliensis*, *P. ziziphus*, Luc., *Pseudaonidia trilobitiformis*, Green, and *Saissetia* sp. Termites do some damage by eating the roots, but do not cause serious loss.

A Cosmopolitan Weevil in the West Indies.—*Agric. News, Barbados*, xxi, no. 516, 4th February 1922, pp. 42–43.

Araecerus fasciculatus, DeG., is recorded as attacking mace and nutmegs in storage in Grenada during 1921.

The remedial measures advocated include fumigation with carbon bisulphide and the removal of spices from storage as soon as possible. Whether fumigation and treatment with heat have any deleterious effect on spices has not yet been ascertained.

Entomologie extracongolaise.—*Bull. Assoc. Planteurs de Caoutchouc, &c., Antwerp,* ix, no. 2, February 1922, p. 36.

A list of pests likely to be introduced into the Belgian Congo is given, together with their food-plants and geographical distribution. *Phthorimaea operculella* and *Icerya purchasi* have already appeared in Katanga.

All plants for importation into the Belgian Congo must bear a certificate showing that they have been examined for pests; and must also be disinfected at the place of origin by fumigation or heat.

Lepidosaphes beckii already occurs in the colony.

NEILLIE (C. R.) & HOUSER (J. S.). **Fighting Insects with Airplanes.**—*Nat. Geogr. Mag., Washington, D.C.,* xli, no. 3, March 1922, pp. 333–338, 6 figs.

An account is given of the successful use of aeroplanes in dusting tall trees infested with *Ceratomia catalpae,* Bdv., in Ohio. The experiment was made against the second brood of the moth, the plane used being equipped with a metal box secured to the fuselage. This box has a capacity for holding a little more than 100 lb. of dry lead arsenate. At the bottom a sliding gate is arranged to be operated by a handle accessible to the observer. A crank at the top is connected to a revolving mechanism at the bottom by a sprocket chain, which, when placed in motion, releases the powder through the previously opened sliding gate. The dust thus dropped into the air current set up by the revolving propeller is violently agitated and forms a dense white cloud, which trails out behind the moving plane.

The grove of *Catalpa* treated by this method was situated on level ground, and was a plot 800 ft. long and 325 ft. wide containing 4,815 trees 25 to 30 feet high. The poison was applied between 3 and 4 p.m. on 3rd August 1921 under almost ideal weather conditions, a steady wind blowing at from 8 to 11 miles an hour. The plane flew at 80 miles an hour at an altitude of from 20 to 30 feet and parallel to the grove, 53 yards to the windward of it. The dust was carried by the wind over the grove, every tree being covered. The plane distributed about 175 lb. of poison, and subsequent examinations showed that not more than one per cent. of the larvae remained alive on the trees. The poison can be placed with marked precision at any point intended, thus dispelling the expectation that it would be wholly beyond control as a result of the air currents.

With further development and improvements this should prove a successful means of controlling forest insects, but its usefulness in treating cotton or other low-growing crops or even large fruit orchards still remains to be proved.

EHRHORN (E. M.). **Division of Plant Inspection. Report for September 1921.**—*Hawaiian Forester and Agric., Honolulu,* xviii, no. 11, November 1921, pp. 248–249. [Received 20th March 1922.]

The pests intercepted include: from California, peach moth in peaches; eelworms in potatoes; *Pseudococcus* sp. on pears; and Lepidopterous and Coleopterous larvae on mountain ash berries and twigs. From China, Lepidopterous larvae in bird seed. From Japan, *Lepidosaphes ficus* on sand pears. From the Philippines, *Parlatoria ziziphus* and *Chrysomphalus aurantii* on pomelos, and pupae of Lepidoptera on oranges.

JACK (R. W.). **Notes on the Maize Stalk Borer or "Top Worm."**—*Rhodesia Agric. Jl., Salisbury,* xix, no. 1, February 1922, pp. 87–88.

The maize stalk-borer [*Busseola fusca,* Hmps.] has been much more abundant than during the previous season owing to late planting and weather conditions, as well as a variety of obscure factors. The results of previous observations have again been confirmed [*R. A.E.,* A, vi, 153], and planting in the neighbourhood of Salisbury should be done between 4th December and Christmas. Whether these dates would be somewhat earlier for lower altitudes is not yet certain. The early planting of a number of rows of maize or kaffir corn as a trap crop is also advocated.

PATTERSON (W. H.). **Report on Entomological and Mycological Work, Aburi, December 31st, 1920.**—*Gold Coast Rept. Agric. Dept., 1920, Accra,* 1922, p. 17.

Owing to the lack of cultivation and unfavourable conditions for the cacao crop, the cacao thrips is rapidly increasing its sphere of damage. Pests of other crops remain as previously reported. *Eriophyes gossypii,* Banks (leaf-blister cotton mite) does not appear to have been imported from Jamaica with cotton seed. Larvae of *Pseudagrilus sophorae,* L., did much damage to *Hibiscus sinensis,* but the beetle did not attack neighbouring cotton plants. All infested stems should be removed and burned.

BRIGGS (G.). **Report of the Agronomist and Horticulturist.**—*Rept. Guam Agric. Expt. Sta., 1920, Washington, D.C.,* 21st November 1921, pp. 15–64, 4 plates. [Received 22nd March 1922.]

Maize is considerably damaged by insect pests in Guam. *Marasmia trapezalis* (leaf-folder) is destructive in the larval stage, feeding on the young leaves, and appears to occur throughout the year. The European corn-borer [*Pyrausta nubilalis*] is present in large numbers on the island, and is most noticeable on mature maize. The first sign of the presence of the moth is the breaking off of the tassel and the protrusion of frass from the stalks. It has also attacked sorghum, rice and other plants. It was first found causing considerable damage in 1917, but it is not known how or when it was introduced into Guam. The burning of all stalks and cobs as soon as they are dry has been recommended as a remedial measure, and so far no others are known. *Aphis maidis* attacks maize in nearly all stages of growth, and leaf-hoppers are commonly found on young maize, and to a less extent on mature plants. The most beneficial insect is the Coccinellid that was introduced from Hawaii, and in nearly all cases it has been found on plants infested with Aphids and mealy-bugs.

Early planting and clean cultivation considerably lessened the injury to rice by *Leptocorisa varicornis* (rice bug). Little insect damage occurred in the main rice crop. In the time-of-planting experiments considerable injury was caused by a Pyralid, which folded the leaves together, thus preventing the growth of the plants. A small amount of damage was caused by a stem-borer, probably *Sesamia* (*Nonagria*) *inferens.* Until better remedial measures are found it would be advisable to plant early maturing varieties either during the end of August or the beginning of September and give the adjoining fields clean cultivation.

A borer, probably *Rhabdocnemis obscura* (sugar-cane borer), was found in the north and east, where it has evidently been for some time. This pest bores holes at the base of coconut leaves. A large green walking stick insect was thought to be responsible for damage to coconut leaves, but the insect was not found in sufficient numbers to account for the extensive damage occurring in short periods in some groves.

On the island of Saipan, *Aspidiotus destructor* attacked coconut palms and the fruit and foliage of banana, papaw and breadfruit trees.

Weiss (H. B.) & Lott (R. B.). **The Juniper Webworm,** *Ypsolophus marginellus*, **Fabr. (Lepid., Gelechiidae).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 3, March 1922, pp. 80–82.

During the last few years *Dichomeris* (*Ypsolophus*) *marginellus*, F., has been increasing in New Jersey and causing considerable damage to the foliage of several varieties of juniper. The first moths emerge about the end of May and are most abundant towards the middle of June. The eggs are usually laid singly on the new terminal growth in the axil formed by the stem and the leaf, though they may also be found on the shoots or stems. The first larvae appear about 8th July and feed on the upper epidermis of the small leaves, causing them to turn brown. Towards the end of July the webs are plainly visible. Hibernation occurs in the partly grown larval condition in the webbed-up foliage. The larvae become active again early in May in northern New Jersey, and pupation begins from the middle of May, lasting about 15 days. There appears to be only one brood in the year.

Infested plants should be dusted with lead arsenate during the end of June or beginning of July, when the webs are small. For later applications sprays must be used. On some varieties of juniper the dried nests containing larvae may be cut and burned early in the spring.

Reyne (A.). **De Cacaothrips** (*Heliothrips rubrocinctus*, **Giard**).—*Dept. Landbouw, Suriname, Paramaribo*, Bull. 44, August 1921, 214 pp., 20 plates, 6 figs. (With a Summary in English.) [Received 20th March 1922.]

Of late years means have been found to combat the witchbroom disease of cacao in Surinam, and the damage done by the cacao thrips, *Heliothrips rubrocinctus*, Giard, has become more and more evident, much loss formerly attributed to the disease being due to it. The first section of this monograph surveys the distribution and damage done in other countries by *H. rubrocinctus*, which occurs in all cacao plantations in Surinam. This is followed by descriptions of its various stages, bionomics and control. Insecticides and limiting natural factors are discussed. Though much has been published on this pest, many points have remained uninvestigated.

At 20–30° C. [68–86° F.] the egg stage lasts 10–13 days. The larval stage usually requires 9–10 days. The prepupal stage lasts about 24 hours, and the pupal, 2–3 days. The adult has an average life of one month, with observed maxima of 46 days for the female and 39 for the male. In regular counts from January 1919 to June 1920 only 77 males occurred among 29,100 females (0·26 per cent.).

The highest percentage of males was 1·5, in the case of a severe infestation. Only a very small percentage of the females mate. In breeding experiments, conducted for two generations, no difference was found between the results of parthenogenetic and sexual reproduction, but whether in the latter case really fertilised eggs were deposited was not definitely ascertained. The maximum number of larvae produced by one individual during its life was 87. The adult is attracted by light, but the larvae avoid it. In Surinam this thrips, when beyond the limits of plantations, is always found in sunny, exposed places. Abandoned cacao fields overgrown by wild trees and a wild cacao forest were free from thrips, apparently because the shade was too dense. Heavy pruning has been followed by severe infestation. In the field the abundance of thrips did not show any relation to variations in temperature. The decrease of thrips during the rainy season seems due to conditions unfavourable to multiplication and not to the thrips being washed away, for they are well protected on the lower surfaces of the leaves. The greatest abundance is in times of drought.

Besides the food-plants already known from the West Indies, the following are found in Surinam: *Eugenia javanica*, *E. malaccensis*, *Bixa orellana*, *Canarium commune*, *Coccoloba uvifera*, *C. latifolia*, *Triplaris surinamensis* and *Psidium polycarpon*. Liberian coffee is not a food-plant, though recorded as such since 1901. In all cases the young leaves are preferred, and in some, such as *C. uvifera*, only these are attacked.

The author does not agree that this thrips does little damage by itself or that it favours *Diplodia*. Vigorous trees are soon exhausted by artificial defoliation, resulting in smaller and fewer leaves, dieback and dying of buds. Leaves damaged by thrips are soon shed, usually dropping in 3 or 4 months, whereas healthy leaves remain on the trees 6–8 months. The thrips does not render trees more liable to *Diplodia cacaoicola* by making wounds in the twigs through which the fungus can enter, as experiments show that feeding and oviposition do not occur on even the youngest twigs.

A 50 per cent. crop loss is common in badly infested fields in Surinam; usually it is higher. Sometimes 5 per cent. of the old trees die after attack; in young trees the percentage is much higher. In some plants (cacao, *Mangifera*, *Anacardium*) the leaf-tissue dies at the feeding marks and the leaves are cast, the tree gradually becoming exhausted. In others (*Terminalia*, *Bixa*) the leaf-tissue does not die, and no increased change of leaf occurs, so that the injury is slight. Liberian coffee in Surinam is often attacked by *Heliothrips haemorrhoidalis*, but no injury has been reported, though cacao attacked to the same extent would suffer considerably.

Natural enemies include Chrysopid larvae, those of *Franklinothrips tenuicornis* and *F. vespiformis*, and a *Cephalosporium* fungus; none of them are, however, of importance.

The following preventive measures are advised: The shade must not be too light and must be uniform; heavy pruning of cacao and its shade trees must be avoided; the soil must be kept moist in the dry season. An experiment in manuring with sulphate of ammonia followed by cultivation of the soil proved negative, though the growth of coffee on a similar soil would have been promoted to a marked extent. Cultural methods are useless for direct control. The work done with various sprays has already been noticed [*R.A.E.*, A, ix, 439]; milk of lime appears to be the best.

GRAF (J. E.) & BOYDEN (B. L.). **Eradication of the Sweet-potato Weevil in Florida (A Report of Progress).**—*U.S. Dept. Agric., Washington, D.C.*, Dept. Circ. 201, 23rd November 1921, 13 pp., 2 figs. [Received 22nd March 1922.]

The results of the work in Florida during the past three years on the eradication of *Cylas formicarius*, F. (sweet potato weevil) are given, as they prove that the same methods will be successful against this pest in other localities where the abundance of wild food-plants does not offer a fresh and continuous source of infestation. Careful sorting of the crop, the use of clean planting stock and an annual change of location for the main planting will reduce infestation to a practically negligible quantity.

JEGEN (G.). **Die Bekämpfung der Obstbaumschädlinge im Winter.** [Winter Measures against Fruit-tree Pests.]—*Landw. Jahrb. Schweiz, Berne*, xxxvi, no. 1, 1922, pp. 83–101.

Investigation has shown that the following fruit-tree pests hibernate in orchards: *Anthonomus pomorum*; *Cydia pomonella*; various bugs—*Anthocoris, Calocoris, Aradus* and *Tingis*; and the flea-beetles, *Phyllotreta undulata, P. atra* and *P. nigripes.*

Parasitic Hymenoptera and Tachinids are comparatively rare on the fruit trees in winter, so that the importance of winter measures is enhanced. Such measures are the scraping of old, rough-barked trees and the burning of the debris, coupled with the spraying of the trees with milk of lime or with a 6–8 per cent. solution of soft soap. The latter must always be used if the trees are infested with woolly aphis [*Eriosoma lanigerum*] in summer.

LEEFMANS (S.). **Bijdrage tot het Vraagstuk der Bladrollers van de Thee.** [A Contribution to the Question of the Leaf-rollers of Tea.]—*Meded. Inst. Plantenziekten, Buitenzorg*, no. 51, 1921, 83 pp., 20 plates. (With a Summary in English.) [Received 22nd March 1922.]

This paper deals principally with the biology of *Cydia* (*Laspeyresia*) *leucostoma*, Meyr., and *Gracilaria theivora*, Wlsm. The tea tortrix, *Homona coffearia*, Nietn., which is such an important pest in Ceylon, is of far less consequence in Java than the other two moths. The rôle played by these pests in British India and Ceylon is reviewed. In Java 18 out of 94 estates reported important losses due to *G. theivora*. On one the crop has been sometimes reduced to one-half, or even lost altogether. In another instance 29 per cent. of the leaves were attacked by *G. theivora* and 25·6 per cent. of the shoots were spun together by *C. leucostoma*. The worst damage is done at altitudes of 3,300–4,900 feet. Both species occur in Sumatra, but no losses have been reported from there. Most of the injury is done in the dry season, but attacks during the rains are not rare. Both old and young plants are attacked. The severest infestation occurs 2–5 months after pruning. It is not clear whether forests near the tea plantations have a bad effect on infestation.

The eggs of *G. theivora* are laid separately, usually near the mid-rib on the younger leaves. At the altitude of Buitenzorg (800 feet) the egg-stage lasts 2–3 days. The larva bores through the leaf-epidermis and begins mining the leaf-tissue. In old leaves it is unable to pierce

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the hard epidermis and dies on the surface. After 3–5 days the larva approaches the leaf-edge, which it rolls up. About seven days after hatching it moves to the mid-rib of this or another leaf and gnaws a hole in it, thus partly cutting off the sap. In 55 out of 79 cases observed the larva left the mined leaf and rolled another one. Pupation takes place in a cocoon on the lower surface of a leaf. The larval stage lasts 10–14 days and the pupal stage 9–13 days. In captivity the moth remains on the underside of a leaf, and the author, who never saw one in the plantations, believes it to be nocturnal in habit. With moths mated in captivity the largest number of eggs obtained from one female was 275. The maximum life observed was 25 days.

Eggs of *C. leucostoma* were obtained from a female captured in the field; reared specimens refused to pair in captivity. At Tjibodas (4,600 feet) the egg-stage lasts 8–10 days. The first damage done by the newly hatched larva is often a minute hole at the base of the very young folded leaves. Later on some almost invisible threads of silk which connect their edges are the only signs of infestation. The growing caterpillar binds the leaves still further so as to hinder their development. At Buitenzorg the larval stage is estimated to last 20 days. The larva forms an envelope between two leaf edges in which it pupates. The pupal stage lasts 10–14 days. The moth is mainly diurnal in its habits. At Buitenzorg a generation requires about five weeks, and about eight at Tjibodas.

Other food-plants of these two moths are *Schima noronhea* and probably also *Phyllanthus* sp. for *G. theivora*, and *Camellia lanceolata* (wild tea) and probably also *Eurya japonica* for *C. leucostoma*. Further investigations are desirable.

It would seem that the sexes of *Homona coffearia* (tea tortrix) are known in European collections as two different species, the male as *H. coffearia*, Nietn., and the female as *H. menciana*, Wlk.* As both were reared by the author out of the same batch of eggs, laid by females (*menciana*), which were fertilised by males (*coffearia*), there is no longer any doubt that the light female and the dark male belong to one species. The offspring obtained always consisted of dark males and light females. *H. coffearia* attacks young, soft leaves as well as old ones. The average times of development were six days for the egg-stage, 24 for the larva, and six for the pupa, giving an average of 36 days at Buitenzorg. The larvae were also found on *Nephelium*, and there must be many other food-plants in Java. Species allied to *Homona* that have been found on tea are *Tortrix* (*Cacoecia*) *micaceana*, Moore, and *Argyroploce erotias*, Meyr. *A. phaeopelta*, Meyr., injures *Schima noronhea*, which is allied to tea. The pupa of *Sylepta* (*Botys*) *tardalis*, Snell., has been found on tea.

Figures and provisional descriptions are given of the many natural enemies of these moths. A beetle and its larva (*Callida* sp.) devour the larvae. A wasp, probably *Odynerus* sp., breaks into the leaves rolled by *C. leucostoma*. Some of the parasites, comprising new species of *Microcentrus*, *Mestocharella*, *Microbracon* and *Diaulomella*, will be described. Others include *Asympiesella indi*, Gir. It is possible that *H. coffearia* in Java and *C. leucostoma* and *G. theivora* in British India and Ceylon are checked by parasites not present in the other region.

Of the three methods employed against rollers, plucking infested leaves, removing larvae, and destroying the larvae *in situ*, only the

* [*H. coffearia* differs in both sexes from *H. menciana*; we have no reliable evidence that the former species occurs in Java.—ED.]

first is discussed. The author advises a trial of six or seven rounds of plucking all visibly attacked shoots and all non-infested shoots ripe for plucking, in spite of the cultural objections to heavy plucking. Prunings must be burned or buried.

ZVIEREZOMB-ZUBOVSKY (E.). **Матеріалы къ познанію Вредителей и Болѣзней Сельскохозяйственныхъ Растеній Донской Области (Списокъ Литературы).** [Material for the Study of Pests and Diseases of Agricultural Plants of the Don Province (Index of Literature).]—**Отдѣлъ Землеустройства и Земледѣлія. Сельскохозяйственная Часть. Бюро по борьбѣ съ Вредителями сельскохозяйств. Растеній.** [*Div. Agron., Agric. Dept., Bur. Control of Pests of Agric. Plants*], *Novotcherkassk*, 1919, 14 pp. [Received 23rd March 1922.]

This list contains all the available literature known to the compiler concerning the injurious fauna and flora of the Don region.

SPEARE (A. T.). *Massospora cicadina*, **Peck, a Fungus Parasite of the Periodical Cicada.**—*Mycologia*, xiii, 1921, pp. 72-82, 2 plates. (Abstract in *Rev. App. Mycol., Kew*, i, pt. 3, March 1922, p. 65.)

Massospora cicadina, a fungus infesting *Tibicen septemdecim*, is described. It is not known to occur on any other host, and on this species is largely confined to the male insects. It is not known how it is perpetuated.

PACZKA (A.). **El Cultivo del Tabaco en Tlapacoyan.**—*Rev. Agric., Mexico*, vi, no. 11, March 1922, pp. 617-623.

In the tobacco-growing district of Tlapacoyan, which includes parts of the States of Puebla and Vera Cruz, beds of tobacco seedlings are frequently injured by ants that attack the seeds. The latter should be dipped in kerosene before sowing. Kerosene emulsion is used against Aphids, which are troublesome, as they cause discoloration and consequent lessening of the value of the leaf.

Among the worst enemies of the growing plants are the Sphingids, *Protoparce celeus* [*R.A.E.*, A, viii, 364] and *P. carolina* [*R.A.E.*, A, viii, 527].

GHESQUIÈRE (J.). **Laboratoire d'Entomologie d'Eala (Equateur). Rapports de l'Entomologiste.**—*Bull. Agric. Congo Belge, Brussels*, xii, no. 4, December 1921, pp. 703-732, 17 figs. [Received 24th March 1922.]

Dysdercus superstitiosus, *D. nigrofasciatus* and *D. ugandanus* are the cotton-stainers occurring at Manyema in the Belgian Congo. Cotton attacked by these bugs is subject to secondary attack by the fungus, *Neocosmospora vasinfecta*. The chief food-plants of *Dysdercus* in the Belgian Congo are native cotton (*Gossypium barbadense*) and other Malvaceae, a list of which is given. The remedial measures advocated include clean cultivation, the destruction of wild Malvaceous plants at the beginning of the rainy season, and the selection as far as possible of the more resistant varieties of cotton.

The natural enemies of *Dysdercus* are a Reduviid and the fungus *Sporotrichum globuliferum*.

Pests of cacao are the Longicorn beetles, *Macrotoma* sp., *Acanthophorus maculatus* and *Glenea* sp., and a Nematode, *Heterodera radicicola*, the latter being most injurious. This Nematode is also found on coffee, *Ageratum conyzoides* and *Urena lobata*. At Eala it occurs on three species of cacao and their cultural varieties, whilst elsewhere it also attacks *Hevea*. The relative resistance of the cacao plant stands in relation to the facility for the more or less continual output of superficial roots. The dieback disease must be considered as secondary to Nematode infestation of the roots. The various remedial measures advocated by other authors are reviewed. Trap crops have not proved effective, at least under such climatic conditions as exist at Eala.

The chief pests of *Urena lobata* are *Dysdercus nigrofasciatus*, *D. melanoderes* and *D. fasciatus*. A list is given of the other insects found on this crop. Hand and net collection are advocated for their destruction. A Proctotrupid is recorded as parasitising the Coreid, *Anoplocnemis curvipes*, F., and the method of parasitism is described. The author does not consider the country suitable for producing silk on a commercial scale, partly owing to the climate and to the presence of natural enemies of *Anaphe* spp. and their food-plants.

HEGH (E.). **Les Termites.**—*Bull. Agric. Congo Belge, Brussels*, xii, no. 4, December 1921, pp. 745–846, 92 figs. [Received 24th March 1922.]

In this further instalment of his monograph on African termites [*R.A.E.*, A, ix, 521; x, 184] the author deals with their feeding habits and cultivation of fungi, and the structure and construction of their nests.

LLOYD (Ll.). **The Control of the Greenhouse White Fly** (*Asterochiton vaporariorum*) **with Notes on its Biology.**—*Ann. App. Biol. Cambridge*, ix, no. 1, April 1922, pp. 1–32, 2 plates, 2 diagrams, 5 figs.

The earliest adults of *Asterochiton vaporariorum*, Westw., were observed in the open on 1st July, and experiments carried out in 1919–20 show that this Aleurodid may survive a mild winter in the Lea Valley out of doors. Both the eggs and adults are able to withstand considerable cold, but the intermediate stages are less resistant. Eggs and feeding larvae on severed foliage shrivel up and die with the drying of the foliage. Under these conditions it is evident that the occasional occurrence of severe winters, when all the foliage except that of evergreens is cut down, must exterminate this species out of doors. The preferred food-plants are tomato, potato, cucumber, vegetable marrow, French beans, tobacco, hollyhock, *Calceolaria*, *Dahlia*, heliotrope and stinging nettle. It can also breed on grapevine, *Fuchsia*, *Calla*, *Begonia* and *Geranium*, but the mortality of the larvae on these plants is great. It is chiefly of economic importance as a pest of tomatos, and the growing of these plants to the exclusion of other crops is a useful precautionary measure against infestation. The average number of eggs laid by one female is about 130, and the rate of oviposition averages about three a day. On smooth leaves the eggs are laid in circles, but on hairy leaves, such as those of the tomato, they are scattered in groups, almost invariably on the lower surface. In the open the incubation period is prolonged during cold weather, the longest record being 117 days. During August at a mean temperature of 58° F. the shortest period was 13–16 days outside.

which is a little more than half that recorded in the greenhouse in December, though the mean temperature in the latter was two degrees higher and approximately the same as that in April under glass with a mean temperature of 67°. Artificial heat is apparently less stimulating than that of the sun. The scale stages were found to vary in the greenhouse from 45 days in February to 17 days in July, and bore a close relation to the temperature.

The only satisfactory method of treating infested plants is by fumigation, various experiments on which are described. Naphthaline and tobacco preparations did not prove very effective, and tetrachlorethane is too costly for trade growers. Sodium cyanide at the rate of $\frac{1}{4}$ to $\frac{1}{10}$ oz. per 1,000 cu. ft. of greenhouse space proved the most effective method. Long fumigations with small doses are more effective than short ones with larger doses. The precautions necessary to avoid damage to plants are described. Greenhouses and cold frames should be freed from the pest during the winter by fumigation.

During these observations *A. sonchi*, Kotinsky, was also recorded in greenhouses.

Jackson (D. J.). **Further Observations on *Sitones lineatus*, L.**—*Ann. App. Biol., Cambridge,* ix, no. 1, April 1922, pp. 69–71, 2 figs.

Owing to the drought during the summer of 1921 the second growth of clover in hay fields was very backward, and the leaves were seriously attacked by adults of *Sitona* (*Sitones*) *lineata*, L. *S. puncticollis*, Steph., *S. flavescens*, Marsh., *S. sulcifrons*, Thunb., and *S. hispidula*, F., were also present, but to a less extent. These weevils live on clover throughout the year and breed at its roots. *S. lineata* abounds on peas, beans and tares, and was also found on lucerne, as were *S. hispidula* and *S. crinita*, Hrbst.

Feytaud (J.). **Les Vers du Raisin.**—*Rev. Zool. Agric. & App., Bordeaux,* xxi, no. 1, January 1922, pp. 6–14, 4 figs.

A brief account is given of the more important pests of grapes, including the Pyralid, *Cryptoblabes gnidiella*, Mill., occurring in North Africa, Italy, Spain and the Maritime Alps ; *Drosophila melanogaster*, Meig., occurring in Europe, America, Africa and Oceania ; *D. funebris*, F., particularly injurious in the Bordeaux region in France ; the Eurytomid, *Euoxysoma vitis*, Saunders, recorded from the United States, but not yet from Europe ; the Curculionid, *Craponius inaequalis*, Say, occurring in the United States ; *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., which are essentially European species and particularly injurious in France ; and *P. viteana*, Clem., occurring in America.

Miles (H. W.). **The Turnip Gall Weevil.**—*Garden, London,* lxxxvi, no. 2625, 11th March 1922, p. 123, 4 figs.

Ceuthorrhynchus sulcicollis, Gyll., is most injurious to turnips and swedes in England, but also attacks rape, various forms of cabbage, mustard, and some Cruciferous weeds such as charlock. It occurs all over the country. The larvae may be found all through the winter until about February, when they leave the galls and enter the soil for pupation. The adults appear in the spring, and the eggs are laid in small holes bored into the tissue of the stem below the surface of the

soil. The larval stage lasts about four weeks in summer, but becomes longer as winter approaches. Birds are undoubtedly the most important natural enemies of this weevil; if possible, poultry should be allowed to run on the ground after the crop has been cut and the stumps pulled up. A mixture of soot and lime, or soot, lime and ashes, dibbled in with the plants when they are put out or scattered round them and pricked in lightly will act as a deterrent. Where the roots of a crop are only slightly attacked, they should be used as food for sheep or cattle; in heavier infestations sheep should be turned loose in the affected field. This should be followed by deep cultivation, and a judicious rotation of crops is also an important factor in the control of this pest.

Batchelor (L. D.). **Walnut Culture in California.**—*Calif. Univ. Agric. Expt. Sta., Berkeley*, Bull. 332, June 1921, pp. 141–218, 33 figs. [Received 27th March 1922.]

In the course of this bulletin on the cultivation of walnut in California a chapter is devoted to the pests attacking it and the methods for their control. The following insects are included: codling moth [*Cydia pomonella*, L.], an Aphid and red spider [*Tetranychus* sp.]. The remedial measures suggested for *C. pomonella* are quoted from Quayle [*R. A. E.*, A, viii, 238]. By the addition of 1 pt. Black-leaf 40 to each 200 gals. of lead arsenate the spray will also be effective against the Aphid. For the control of Aphids alone, nicodust is advocated. Red spider may be controlled by dusting with three parts of dry sulphur to one of lime.

Bioletti (F. T.), Flossfeder (F. C. H.) & Way (A. E.). **Phylloxera-resistant Stocks.**—*Calif. Univ. Agric. Expt. Sta., Berkeley*, Bull. 331, October 1921, pp. 81–139, 11 figs. [Received 27th March 1922.]

As a result of the investigations here described it is now possible to indicate the relative value of certain stocks for most of the principal grape varieties grown under conditions such as exist in the Yolo and Fresno counties, which should prove useful to grape growers who intend to plant *Phylloxera*-resistant vines.

In order to facilitate the choice of stock all the available data of importance have been arranged in tabular form showing the behaviour of a particular grape variety on each stock with which it was tested.

Smith (R. E.). **The Preparation of Nicotine Dust as an Insecticide.**—*Calif. Univ. Agric. Expt. Sta., Berkeley*, Bull. 336, November 1921, pp. 261–274. [Received 27th March 1922.]

The first experiments undertaken with nicotine dust were made in 1917 against *Chromaphis juglandicola*, Kalt. (walnut aphis), and subsequent tests are described. As nicotine is very expensive and comparatively large amounts are required in the mixtures, it is necessary to produce the most powerful dust possible with a minimum of nicotine. The toxicity of the dust is influenced by the form and amount of nicotine used and the nature of the filler. According to the author's observations the dust acts as a fumigant. The two alternatives presented in utilising a given amount of nicotine are that it should be as volatile as possible and give off the maximum

amount in the minimum of time, or that it should be less volatile and so act more slowly but for a longer time. The former is the better method, even though it loses its efficiency very soon.

Almost any cheap, readily available material that is capable of being reduced to an impalpable "smoky" dust, fairly bulky and free from undesirable effects, may be used as the filler. The filler should be finely divided, fairly heavy, and as dry as possible before adding the nicotine, and a material that does not absorb the nicotine readily produces a more quickly acting dust. A light filler is better for large trees like walnuts, especially with insects that are easily killed. Brief notes are given on materials that have been tested, and these include kaolin, which in many respects is the best material that has been found. The chief objection to hydrated lime is the irritation it causes to the skin and eyes of the operator. Quick lime produces heat in the reaction, causing the loss of some of the nicotine. Calcium carbonate makes a satisfactory filler when dried and finely pulverised. Calcium sulphate forms hard lumps in drying. Diatomaceous earth tends to cling together in flakes and particles and is very absorptive. Talc is heavy and more expensive, but, when thoroughly pulverised, makes a very good dust and sticks well. Although sulphur is heavy and non-absorptive, it has been shown that when mixed with it a given amount of nicotine is more effective against insects than with any other filler mentioned. Only the very finest grades should be used, and it cannot be used on certain crops, especially cantaloups, strawberries and walnuts, in California in the hot weather without danger of scorching. Tobacco dust when well ground is absorptive, but is too expensive as a carrier.

Various compounds of nicotine have been tested, but with the exception of nicotine oleate none are as effective as pure nicotine. Other poisons have also been tried, but none show promise of success compared with nicotine, except pyrethrum, which is too expensive. The addition of some other substances increases its effect. About 5 per cent. of kerosene may be added to a fairly dry dust without destroying its dusting qualities. Dry lime-sulphur or a similar preparation also increases efficiency. Black-leaf 40, kerosene and dry lime-sulphur form a very powerful dust. In liquid form 0·1 per cent. nicotine is considered a strong mixture, and in dust 10 per cent., and the greatest possibility of reducing the amount of nicotine lies in making it as quickly volatile as possible. The hotter the weather the greater the effect produced by a given strength of dust. The possibility of reducing the cost of manufacture and of a new type of dusting machine are discussed.

The following species have been experimented upon with at least promising results: *Macrosiphum rosae*, L. (rose aphis), *Acyrthosiphon* (*M.*) *pisi*, Kalt. (pea aphis), *Aphis gossypii*, Glover (melon aphis), *A. rumicis*, L. (black bean aphis), *A. malifoliae*, Fitch (rosy apple aphis), *Brevicoryne* (*A.*) *brassicae*, L. (cabbage aphis), *Toxoptera aurantii*, Boy. (black citrus aphis), *Scirtothrips citri*, Moulton (citrus thrips), *Thrips tabaci*, Lind. (onion thrips), *Taeniothrips inconsequens*, Uzel (*pyri*, Dan.) (pear thrips), *Eutettix tenella*, Baker (beet hopper), *Erythroneura comes*, Say (vine hopper), *Anasa tristis*, DeG. (squash bug), *Pieris* (*Pontia*) *rapae*, L. (cabbage worm), *Pseudohazis eglanterina*, Boisd. (brown day moth), *Hyphantria cunea*, Drury (fall webworm), the butterflies, *Lemonias chalcedon*, D. & H., *Pyrameis* (*Vanessa*) *cardui*, L., and *Vanessa caryae*, Hb., *Nysius ericae*, Schill. (false chinch bug), *N. ericae minutus*, Uhl., *Malacosoma* spp. (tent caterpillars) and

Diabrotica spp. (cucumber beetles). These insects show a great difference in their susceptibility to nicotine, the range being from a 1 per cent. dust, which gives a very good control for *Chromaphis juglandicola*, to the 10 per cent. mixture.

This dust may be mixed with sulphur, lead arsenate, dry pulverised Bordeaux mixture, or with any dry fungicide or insecticide for the control of more than one pest at one application.

DE ONG (E. R.). **Selection and Treatment of Waters for Spraying Purposes with especial reference to Santa Clara Valley.**—*Calif. Univ. Agric. Expt. Sta., Berkeley*, Bull. 338, December 1921, pp. 301–314, 2 figs. [Received 27th March 1922.]

During the summer of 1919 a survey was made to ascertain the degree of hardness of waters in various parts of the Santa Clara Valley, California, the results of which are here described.

The California waters have an unusually high chlorine content, and this may account for the injury occurring where acid lead arsenate has been used in sprays. Basic lead arsenate should be substituted for use with such waters.

CANELA (P. F.). **Sobre la Presencia de una Plaga en los Frutales de San Luis.**—*Bol. Minist. Agric. Nac., Buenos Aires*, xxvi, no. 3, July–September 1921, pp. 253–256. [Received 27th March 1922.]

Fruit-trees in San Luis, particularly peaches, damsons and plums, are seriously attacked in many instances by the Scolytid, *Scolytus rugulosus*, Ratz., which is spreading to an alarming extent. As many as five generations may be produced in a favourable season. The larvae of the last generation remain in the galleries between the bark and the wood, pupating there in the following spring and emerging as adults about two weeks later. The females, after fertilisation, immediately begin to construct fresh galleries in the young branches, where the various generations develop. The remedies recommended are those generally used for this borer [*R. A. E.*, A, ii, 164]. Clean cultivation and early pruning are accessory measures.

LICHTENSTEIN (J. L.). **La Bruche des Haricots** (*Laria obtecta*, **Say**).—*Progrès Agric. & Vitic., Montpellier*, lxxvii, no. 13, 26th March 1922, pp. 298–300.

Bruchus (*Laria*) *obtectus*, Say, is recorded as causing serious damage to beans in the neighbourhood of Toulouse. Infestation appeared to be less severe in beans planted 2nd July than in those planted earlier, and it is thought that the judicious choice of the date for planting may prove a useful preventive measure.

SURCOUF (J. M. R.). **Note sur une Maladie du Palmier : Le Doud.**—*Bull. Soc. Hist. Nat. Afr. Nord, Algiers*, iii, no. 2, February 1922, pp. 34–35.

The date palm disease known as " Doud " is considered to be due to the lesions caused by *Phyllognathus silenus* and *Oryctes bispinosus*, both species being abundant in Algeria, during the adult and larval stage, especially the latter. The disease may be the direct result of injury or due to secondary infection of a bacterial nature [*cf. R. A. E.*, A, x, 271].

B[ALLOU] (H. A.). **A Wood-boring Moth.**—*Agric. News, Barbados,* xxi, no. 517, 18th February 1922, pp. 58–59.

The life-history of *Duomitus punctifer,* Hmps., which occurs throughout the Lesser Antilles, and some of its food-plants have already been noticed [*R.A.E.*, A, iii, 73]. Other food-plants include orange, tangerine, *Grevillea* and *Malpighia*. This Cossid only attracts attention at intervals, its attacks being more severe in dry seasons and usually on trees that for various reasons are not thriving. Remedial measures include heavy pruning of severely attacked trees (care being taken that all the branches containing larvae and pupae are promptly burned to prevent their further development), probing the tunnels with a wire to kill the borers and fumigating with carbon bisulphide. These last two methods are difficult to apply to tall trees.

FELT (E. P.). **New Indian Gall Midges (Itonididae).**—*Mem. Dept. Agric. India, Calcutta,* Ent. Ser., vii, no. 4, July 1921, pp. 23–28. [Received 29th March 1922.]

The new Cecidomyiids described are *Camptomyia ricini,* reared from dry castor-bean stems (*Ricinus communis*); *Asphondylia pongamiae,* which produces galls on *Pongamia glabra* and is parasitised by a Chalcid; *Contarinia andropoginis,* reared from the ear-heads of cholam (*Andropogon sorghum*); *Itonida seminis,* reared from ear-heads of cumbu (*Pennisetum typhoideum*); and *Cecidomyia artocarpi,* reared from rotting jak fruit (*Artocarpus*).

FROGGATT (W. W.). **Arsenite of Soda the Best Defence against Grasshoppers.**—*Agric. Gaz. N.S.W., Sydney,* xxxiii, pt. 2, February 1922, p. 87.

An account is given of spraying about 5,000 acres of land heavily infested with large swarms of grasshoppers. About 3,000 gals. of a spray containing 1 lb. sodium arsenite, 4 lb. molasses and 16 gals. water were used. Logs, thistles and other likely shelters were successfully sprayed, as well as the egg patches. At one period petrol and kerosene were used, but this was abandoned as less economical.

Ziekten en Plagen der Cultuurgewassen in Midden-Java in 1921. [Diseases and Pests of Cultivated Plants in Central Java in 1921.] —*Proefst. Mid.-Java, Salatiga,* Circ. 1, February 1922, 4 pp. [MS.]

A severe infestation of *Helopeltis* occurred on cacao, and the carefully arranged introduction of ants did not have uniform success. The cacao moth [*Acrocercops cramerella*] also occurred in large numbers, but experiments against it, including the use of natural enemies, do not yet warrant the publication of results. The gramang ant [*Plagiolepis longipes*] proved a great nuisance on one estate.

The coffee berry beetle [*Stephanoderes hampei*] occurred in places.

Pests of *Hevea* included termites, which were, however, of little importance in general as a result of the plantations being well looked after.

HARUKAWA (C.). **Studies on Lime-sulphur Mixture.**—*Ber. Ohara Inst. landw. Forsch., Kuraschiki,* ii, no. 1, 1922, pp. 1–20.

In these experiments, conducted in 1917 and 1919, the author prepared two kinds of lime-sulphur, one in which equal amounts of lime and sulphur were used, and the other in which the amount of

sulphur used was double that of the lime. The lime and water used was the same in both cases, and the two mixtures were diluted to the same degree. There seems to be practically no difference in effectiveness between the two.

Lime-sulphur seems unable to dissolve the scales of *Aspidiotus duplex*, but when scale-insects (*Diaspis pentagona*, *A. duplex* and *A. perniciosus*) have been sprayed with lime-sulphur, the attachments of the scales become loosened after a certain time, and some of them drop from the tree, this occurred with both dead and apparently living insects. The results of the experiment seem to show that the insects that do not change colour a certain time after spraying are not killed.

FARSKÝ (O.). **Mšice krvavá** (*Schizoneura lanigera* **Hausm.**).—*Ochrana Rostlin, Prague*, i, no. 1–2, May 1921, pp. 10–11, 1 fig. [Received 14th March 1922.]

A brief account is given of the injury caused by the Aphid, *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., to apples in Moravia. Systematic remedial measures should be undertaken and directed against isolated as well as widespread infestations.

FARSKÝ (O.). **Puklice švestková** (*Lecanium corni* **Bché.**).—*Ochrana Rostlin, Prague*, i, no. 1–2, May 1921, pp. 11–12. [Received 14th March 1922.]

Eulecanium (*Lecanium*) *corni*, Bch., is recorded as injuring plums in Moravia.

Škody na osení, způsobené bzunkou (*Oscinis frit*, **L.**, *O. pusilla*, **Meig.**). [Injury caused to Grain by *Oscinis frit*, L., and *O. pusilla*, Meig.]—*Ochrana Rostlin, Prague*, i, no. 1–2, May 1921, pp. 15–16. [Received 14th March 1922.]

Great damage is caused both to spring and winter grain crops by *Oscinella* (*Oscinis*) *frit*, L., and *O.* (*O.*) *pusilla*, Meig., barley, oats, wheat and rye being attacked. Judicious selection of the time for sowing is the principal measure advocated against these midges.

RAMBOUSEK (F.). **Časové otázky ochrany řepní.** [Notes on the Protection of Sugar-beet.]—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, p. 4. [Received 14th March 1922.]

A brief account is given of the damage caused to sugar-beet by Aphids, the beetles, *Cassida nebulosa* and *Silpha obscura*, and the beet fly [*Pegomyia hyoscyami*].

NOVÁK (S.). **Hojné vyskytování se háďátka zhoubného.** [Notes on *Tylenchus devastatrix*.]—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, pp. 6–8. [Received 14th March 1922.]

Many complaints have been received about the damage caused to crops by *Tylenchus dipsaci* (*devastatrix*). The chief crops attacked are rye, oats, barley, wheat, clover, lucerne, hops and onions. A brief account is given of the injury done. The remedial measures advised are chiefly cultural.

Komárek (J.). *Tortrix viridana.*—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, p. 8. [Received 14th March 1922.]

Tortrix viridana, L., is recorded as injuring oaks (*Quercus pedunculata*) in various parts of Bohemia. Hibernation apparently occurs in the egg-stage, the larvae hatching about the beginning of May. They pupate towards the end of May and beginning of June. The adults appear from the middle of June to July and oviposit on the buds of the young shoots. Beech, lime and other trees may also be attacked. There is only one generation a year. Birds, especially tits, are the chief natural enemies of this moth.

Vielwerth (V.). **Ohrožení zeleného krmu mšicami.** [Vegetable and Forage Crops threatened by Aphids.]—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, pp. 9–10. [Received 14th March 1922.]

Acyrthosiphon pisi (*Siphonophora ulmariae*) is recorded as injurious in several districts in Czecho-Slovakia. The food-plants include clover, lucerne and peas, the Aphids occurring on the lower surface of the leaves and on the stems. The damage caused often amounts to 30 per cent. or more. This pest is apparently spreading rapidly, as the application of insecticides is practically impossible owing to scarcity and high cost of materials.

Novák (S.). **Rozšíření bekyně sosnové (mnišky) na ovocných stromech.** [The Spread of the Nun Moth on Fruit Trees.]—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, p. 10. [Received 14th March 1922.]

Liparis (*Psilura*) *monacha* is apparently spreading in Czecho-Slovakia and causing serious damage to fruit trees. In some cases apples and pears have been completely defoliated. Even the pedicels of the fruit have been attacked, causing it to drop. Oak, beech and alder are also infested. The measures adopted are banding and the collection of the larvae in sheets spread under the trees.

Souček (B.). **Mrchožrouti na řepě.** [*Silpha atrata* on Sugar-beet.]—*Ochrana Rostlin, Prague*, i, no. 3, July 1921, p. 11. [Received 14th March 1922.]

Silpha atrata has proved very destructive to sugar-beet in many parts of Moravia. The eggs are laid singly in the ground, five to ten being laid by each individual. The larvae appear in from eight to twelve days and are mature in three or four weeks. Pupation lasts ten to twenty days. The larvae are voracious feeders; other food-plants are lucerne, vetch, red beet and potatoes. Remedial measures include artificial manuring, clean cultivation, and spraying with arsenicals, etc. The most effective method, however, is to turn poultry into the field.

Takahashi (R.). **The Japanese Aphididae I.**—*Taihoku, Formosa.* Published by the Author, 1921.

This paper deals with nine species of Aphids, including a new genus and three new species, and some notes on their life-histories are given.

Neochromaphis, gen. n., allied to *Chromaphis*, and distinguished by the anal plate being only slightly notched, not bifurcated, and by the females, whether parthenogenetic or oviparous, bearing a pair of large

wax-plates on the sides of the abdomen, is erected for *Neochromaphis carpini*, sp. n., found on the lower surface of branches of *Carpinus yedoensis* in Tokyo. *Chromaphis carpinicola*, sp. n., is also found on the same tree in the same locality. *Calaphis magnolicolens*, sp. n., occurs on the leaves of *Magnolia hypoleuca* in Tokyo.

SONAN (H.). **The Formosan Ichneumon Flies and their Hosts.**—*Taiwan Nōjihō* [Review of Formosan Agriculture], no. 180, 1922.

Besides seven species, of which the hosts are already known, two more parasitic on the larvae of Lepidoptera are recorded, namely, *Excristes albicincta*, Morl., parasitic on *Clania variegata*, Cram., and *Phytodiaetus capuae*, Morl., parasitic on *Homona menciana*, Wlk.

TAKAHASHI (R.). **On the Formosan Aphididae.**—*Taiwan Nōjihō* [Review of Formosan Agriculture], no. 182, 1922.

A list of 98 species of Formosan Aphids is given with remarks on their food-plants, distribution and the degree of injury for which they are responsible.

OKUNI (T.). **Insects Injurious to Poppy in Formosa, II.**—*Bull. Agric. Expt. Sta., Government of Formosa*, no. 142, 1921.

In the fields of the experiment station, the author has observed various important facts concerning the mode of infestation by the poppy thrips and the best method of preventing the damage it does. He found from field experiments that the thrips are transferred to the poppy flowers by bees, which are attracted by the colour of the petals, whereas the capsule, with the petals removed, is quite free from the insect and ripens normally. It is concluded, in consequence, that removal of the petals at the proper time, within an hour or two of blooming, is the only method of preventing the attack of the thrips.

SONAN (H.). **The Feeding Habit of Asopinae.**—*Konchu Sekai* [The Insect World], xxv, no. 291, 1922.

The author has observed the feeding habits of two Formosan Pentatomids, *Cazira verrucosa*, Westw., and *Canthecona furcellata*, Wolff, in detail, and has come to the conclusion that both species are beneficial to agriculture as they are predacious, like the other bugs of the subfamily ASOPINAE ; the former attacks Coccinellid and Chrysomelid beetles and the latter the larvae of Noctuids.

WULKER (G.). **Biologie und Forstliche Bedeutung der Rüsselkäfer.** [The Biology of Weevils and their Importance in Forestry.]—*Internat. Ent. Zeitschr., Guben*, xv, nos. 11 and 13, 20th August and 17th September 1921, pp. 87 and 98.

This summary includes an account of the injury caused to conifers by *Hylobius abietis*, L., in Germany. Other weevils mentioned are *Pissodes notatus* attacking conifers, *Cryptorrhynchus lapathi*, *Calandra granaria* and *C. oryzae*, the last two having become serious pests of grain in Germany since the war.

VOGT (—). **Schädlinge unseres Obst- und Gartenbaues und deren Bekämpfung.** [Pests of Orchards and Gardens and their Control.] —*Internat. Ent. Zeitschr., Guben*, xv, no. 13, 17th September 1921, pp. 98–102.

A brief account is given of the remedial measures to be employed against the more important pests of fruit trees and vegetables in Germany. Those dealt with are: *Anthonomus pomorum*, L., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Malacosoma neustria*, L., *Cheimatobia brumata*, L., *Cydia* (*Carpocapsa*) *pomonella*, L., *Hyponomeuta* (*Yponomeuta*) *malinellus*, Z., *H. padellus*, L., *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., *Ceuthorrhynchus sulcicollis*, Germ., *Phyllotreta nemorum*, L., *Haltica oleracea*, L., *Pieris brassicae*, L., *P. rapae*, L., *Polia* (*Mamestra*) *oleracea*, L., *P.* (*M.*) *persicariae*, L., *Barathra* (*M.*) *brassicae*, L., *Euxoa* (*Agrotis*) *segetum*, L., *Melolontha melolontha*, L., (*vulgaris*, F.), *Crioceris asparagi*, L., *C. duodecimpunctata*, L., and *Platyparea poeciloptera*, Schr.

Amendment to the Regulations under the Destructive Insect and Pest Act. Amendment no. 15 (No. 3 of 1922). —*Canada Dept. Agric., Ottawa*, 1 p. MS.

The Amendment No. 12 to this Act, dealing with the European corn borer [*Pyrausta nubilalis*], passed on 12th May 1921 [*R.A.E.*, A, ix, 413], is rescinded by an Order-in-Council dated 21st March 1922. In substitution therefor it is enacted that all maize and broom maize (including all parts of the plants), all sorghums, Sudan grass, cut flowers or entire plants of *Chrysanthemum*, *Aster*, *Cosmos*, *Zinnia*, hollyhock, and cut flowers or entire plants of *Gladiolus* and *Dahlia* except the bulbs thereof without stems, oat and rye straw as such or when used for packing, celery, green beans in the pod, beets with tops, spinach and rhubarb, are prohibited entry into Canada from certain districts enumerated in the States of Massachusetts, Michigan, New Hampshire, New York, Ohio and Pennsylvania, unless they are accompanied by a certificate of inspection issued by the U.S. Department of Agriculture stating that the shipment is free from infestation by *P. nubilalis*. This prohibition does not apply to the plants enumerated when they have been manufactured or processed in such a manner as to eliminate all risk of carriage of *P. nubilalis*, nor to cleaned shelled maize, nor to cleaned seed of broom maize.

Amendment to the Regulations under the Destructive Insect and Pest Act. Amendment no. 17 (No. 5 of 1922).—*Canada Dept. Agric., Ottawa*, 1 p. MS.

An Amendment to this Act, dealing with the alfalfa weevil [*Hypera variabilis*], passed on 14th April 1920 [*R.A.E.*, A, viii, 416], has been rescinded by an Order-in-Council dated 21st March 1922. The importation into Canada is now prohibited of alfalfa (lucerne) hay, whether for feeding, packing or other purposes, originating in certain areas enumerated of the States of Colorado, Idaho, Nevada, Oregon, Utah and Wyoming. This prohibition does not extend to shipments of lucerne transported on a through bill of lading. All shipments consigned to the provinces of Manitoba, Saskatchewan, Alberta and British Columbia shall be accompanied by a certificate signed by the consignor stating the county and state in which the lucerne was grown.

Northern Rhodesia: Government Notice No. 44 of 1922—*Livingstone*, 29th March 1922, 1 p. MS.

Under the above notice, dated 29th March 1922, Government Notice No. 34 of 1919, prohibiting the importation of citrus trees or parts thereof from the Union of South Africa, is cancelled, and these may now be imported from the Cape and Natal Provinces only, by permits to be issued by the Secretary for Agriculture.

MILES (H. W.). **Some Important Insect Pests of Strawberries.**—Separate from *Jl. Bath & West & Southern Counties Soc.*, *Bath*, 5th Ser., xvi, 1921–22, 16 pp., 12 figs.

Owing to the increased cultivation of strawberries in the Cheddar and Tamar Valleys, the life-histories and habits of the most important pests likely to occur in the west and south-west of England are here recorded. A key is given for identification of the insect concerned from the nature of the damage.

Larvae of *Melolontha melolontha*, L. (*vulgaris*, F.) (cockchafer) are pests of strawberries, raspberries and even young trees. Remedial measures include light traps, and planting in soot and lime. *Cetonia aurata*, L., has a similar life-history. The eggs are laid in soil which contains abundance of organic matter. On hatching the larvae feed on this for a time varying up to three years. The adults are also said to feed on strawberry flowers.

The life-history of *Agriotes obscurus*, L., has already been noticed [*R.A.E.*, A, viii, 138]. The remedial measures for this wireworm and for *Athous haemorrhoidalis*, L., include planting in a dressing of superphosphate, and incorporating it with the soil around the roots. Soil insecticides are of little value.

Weevils attacking strawberry roots include *Otiorrhynchus tenebricosus*, L. (red-legged weevil), *O. picipes*, F. (raspberry weevil), *O. sulcatus*, F. (vine weevil) and *Phyllobius oblongus*, L. (oblong leaf weevil). The larvae may be found in September and all through the winter. The adults feed on young portions of unfolding leaves and buds, later on the petals and stamens and then on the fruit. Where soil fumigation with carbon bisulphide cannot be followed, Theobald suggests forking in a mixture of 1 pint carbolic to 1 bushel of ash, or naphthaline and fine ash at the rate of 1 : 10. Spraying with 4 lb. lead arsenate paste to 100 gals. water about 14 days before the buds open kills the adults, and it is advisable to spray again immediately after the flowering period is over. The adults of *Anthonomus rubi*, Hbst. (strawberry blossom weevil), hibernate in the soil and rubbish. In spring they feed on leaves and buds, and later deposit eggs among the stamens, one to each bud, afterwards crawling down the stem and cutting it partly through so that the drooping petals form a protecting covering for the larvae, which hatch in eight or ten days. They feed on the pollen and completely destroy the stamens. The adults emerge two or three weeks after pupation and feed on the leaves. Spraying as for *Otiorrhynchus* spp. is recommended. The application of powdered sulphur and lead arsenate has been successfully used in America and noticed elsewhere [*R.A.E.*, A, vii, 256]. So far as is at present known the adults of *Barypithes* (*Exomias*) *araneiformis*, Schr. (small strawberry weevil) are injurious and eat the fruit. They may be trapped by laying large pieces of damp bark covered with moss between the rows.

Eggs of *Tipula oleracea*, L., are deposited from June to October singly or in batches, usually in dense moist herbage. Strawberry roots are attacked by the larvae in the daytime, and at night they feed on the stems and leaves and then on the crowns. Pupation occurs at six inches or deeper in the soil. In the Midlands and the west and south-west of England two fairly well marked broods occur, the first from April to the end of May or early June, and the second in September and October. Remedial measures include soil insecticides, such as Vaporite or gaslime that contains calcium sulphocyanates. Where an attack is in progress a broad-wheeled farm cart should be drawn up and down between the rows very early in the morning and late in the evening to crush the larvae and consolidate the soil. During the day the top two inches of soil should be well hoed or raked into a fine tilth, which will get hot and dry and kill the larvae by exposure.

The larvae of *Agrotis* sp. and *Hepialus* sp. destroy strawberry plants during the winter. Those of the former feed all the autumn and winter, pupating in the soil in April and May, the adults emerging a month later. The eggs of *Hepialus lupulinus*, L., are laid in May and June and hatch in nine days. The larvae enter the soil, feeding on the roots, etc., till April, when they pupate, the adults emerging in about a month. The substances that have been recommended against these cutworms are soot, lime, gaslime, wood ashes, Kainit, muriate of potash and Vaporite. Trapping with turves laid grass-side down is effective.

The life-history and remedial measures recommended for *Oxygrapha comariana*, Z. (strawberry tortrix) have already been noticed [*R.A.E.*, A, viii, 516]. *Macrosiphum* (*Siphonophora*) *fragariella*, Theo. (strawberry aphis) infests the strawberry from early spring till the end of the picking season. The winter is passed in the egg-stage, and the stem-mothers hatch in March or early April. This Aphid sucks the juices from the young leaves, the hearts of the crowns and the developing blossom trusses. Remedial measures include the cutting off and burning of the leaves in the winter. Spraying is difficult, but the stem-mothers may be controlled in early April with $2\frac{1}{2}$ lb. soft soap and $\frac{1}{4}$ pint nicotine to 50 gals. soft water (if hard water is used, 5 lb. soap may be necessary). No definite remedial measures are known for the control of the millipede, *Blaniulus guttulatus*, Gerv., which attacks the fruit. Attacks seem most prevalent after the addition of farmyard manure, leaf mould or other organic matter.

In the case of all these pests all waste vegetable matter should be burned, including herbage along hedge sides and on waste ground.

Marshall (G. A. K.). **On New Species of** *Alcides* **from the Oriental Region.**—*Ann. and Mag. Nat. Hist., London*, ix, no. 52, April 1922, pp. 393–411, 1 plate, 1 fig.

The new species described include *Alcides gmelinae* found in the United Provinces boring in twigs of *Gmelina arborea*, from which it was also bred in Assam; this weevil also occurs in Burma.

Ballard (E.). **Two New Species of** *Ragmus* **from South India.**—*Records Ind. Mus., Calcutta*, xxii, pt. iv, no. 26, December 1921, pp. 509–510, 1 plate. [Received 4th April 1922.]

Of the two new Capsids described in this paper, *Ragmus morosus* was taken on cotton, *Crotalaria juncea* (sunn hemp), *Andropogon*

sorghum (cholam), and *Sesamum indicum* (gingelly). This species was first observed sucking young cotton bolls, but will also attack and kill thrips, Aphids and mites. *R. flavomaculatus* was taken on *A. sorghum*, and will devour Aphids and thrips. These Capsids are commonly found on both native and Cambodia cotton from about December to August, but become scarce about the end of June. Both are suspected of being instrumental in introducing pathogenic bacteria into young bolls and causing them to fall prematurely.

Trogoderma khapra. **Memorandum issued by the Ministry of Agriculture and Fisheries.**—*Bur. Bio-Technology, Leeds*, Bull. 5, March 1922, pp. 132–133.

In this memorandum, issued by the Ministry of Agriculture and Fisheries, an account is given of *Trogoderma khapra*, a beetle that does much damage to stored wheat in India and has lately been recorded as a pest in maltings in England [*R.A.E.*, A, x, 32]. The adult is said to cease activity at the temperature of the Punjab winter and to flourish best at the temperature of the Punjab summer ; it is therefore unlikely that its introduction into England from India will result in its becoming a serious pest in this country, especially as threshed wheat is seldom kept in storage for more than a few weeks. Moreover, *T. khapra* would probably breed slowly, if at all, at the temperature at which imported wheat is usually stored. In the case of malt, where a high temperature is maintained in the course of manufacture, the insect might prove very troublesome. It is not considered on the whole that any action is necessary on the part of the Ministry, though from the Imperial standpoint the pest is an important one and merits most careful attention.

PARKER (T.). **Red Spider. A Note on its Control.**—*Bur. Bio-Technology, Leeds*, Bull. 5, March 1922, pp. 143–149.

This paper has already been noticed from another source [*R.A.E.*, A, x, 110].

M[ASON] (F. A.). **A Bulb Pest.**—*Bur. Bio-Technology, Leeds*, Bull. 5, March 1922, pp. 150–151, 1 fig.

Bulbs grown in water, peat moss or fibre, for indoor decoration, frequently fail to flower owing to the presence of the bulb mite, *Rhizoglyphus echinopus*, F. & R., which generally eats away the flowering scape, the space above being filled by an accumulation of black decaying matter and excreta. Hundreds of mites are found in one bulb; sometimes they are alone responsible for the damage and sometimes the primary cause of disease is eelworms or flies.

The pest can be destroyed without injury to the flower if the bulb is immersed, before planting, in a solution of 1 oz. of nicotine petroleum emulsion in 1 gal. of water. After immersion for one minute the bulbs should be allowed to drain before being planted, and as a further precaution they should be sprayed with the same mixture at two or three intervals between potting and flowering.

Hopping (R.). **A Review of the Genus** *Monochamus*, **Serv. (Cerambycidae, Coleoptera).**—*Canadian Ent., Orillia*, liii, no. 11, November 1921, pp. 252–258, 2 plates. [Received 7th April 1922.]

A key is given to the North American species of *Monochamus* based on extensive examinations made by the author. *M. obtusus*, Casey, *M. oregonensis*, Lec., and *M. scutellatus*, Say, are considered to be three distinct species. *M. monticola*, Casey, appears to be the true *M. oregonensis*, Lec. These beetles are pests of conifers, particularly *Pinus* spp.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept., St. Vincent, 1920, Barbados*, 1922, pp. 12–14.

The work connected with cotton-stainer (*Dysdercus delauneyi*) consisted of the pruning of growing stumps and seedlings of silk-cotton trees (*Eriodendron anfractuosum*) and John Bull trees (*Thespesia populnea*), as well as the destruction of perennial cotton. The general opinion was that there were probably more stainers in the Island than at the same time in the previous year, but that the attack, generally speaking, was not earlier than usual. The cause of this increase is attributed to indifferent burying of cotton seed manure, the large amount of cotton debris left in the field, and the increased area under the crop during the previous season. Towards the end of the season the degree of infestation varied considerably. It was thought that stainers carried over the close season on *Sterculia caribaea* growing in the northern part of the island, but the attacks did not decrease towards the south. The degree of infestation was judged by the amount of internal boll disease on the cotton as well as by the numbers of stainers found. Control should be practised on the estates before the insects leave the field. When cotton plants are being destroyed and after their destruction, heaps of cotton seed or cotton seed meal should be placed in cool and shady places on the borders of the field, and any insects trapped should be destroyed by means of a kerosene or gasoline torch. Fresh traps must be used periodically, as constant use of fire renders the bait unpalatable.

Other pests include *Alabama* (*Aletia*) *argillacea*, black scale [*Saissetia oleae*], Aphids, and red spider, but they were not responsible for any material damage. *Eriophyes gossypii* (leaf-blister mite) was found on secondary growth of old plants during the latter part of the season.

Ballou (H. A.). **Mealy-bug on Cacao.**—*Agric. News., Barbados*, xxi, no. 518, 4th March 1922, p. 74.

In 1921, a collection was made of mealybugs from cacao and other plants in Grenada. These included: *Pseudococcus citri*, Risso, on cacao pods, twigs, cushions and stems, and on sugar-apple fruit, marigold stems and leaves of *Castilloa*; *Philephedra broadwayi*, Ckll. (Broadway's mealybug), on cacao cushions and on soursop fruit; *Pseudococcus nipae*, Mask., on leaves of avocado, banana, galba [*Calophyllum calaba*], guava, orange and pigeon pea; *P. bromeliae*, Bch. (pine-apple mealybug), on cacao cushions, ornamental croton stem, mango leaf, pineapple fruit and sugar-cane; *P. longispinus*, Targ., on breadfruit leaf; *Phenacoccus grenadensis*, Laing, on aster leaf and stem; and *Icerya montserratensis*, Ril. & How., on coconut leaf.

Philephedra broadwayi seems to be known only in Grenada, where it has probably been present for the past 25 years, and where it is associated with a condition of the cacao trees in which enormous numbers of flowers are produced on greatly enlarged and distorted cushions, which bear very few pods. It is often the only mealybug on these cushions, where it occurs in great numbers, and may be the direct cause of the lack of bearing. Various remedial measures are being tested, but have not as yet yielded any definite results.

SWENK (M. H.). **Insect Pests of Stored Grains and their Control.**—*Nebraska Agric. Expt. Sta., Lincoln,* Circ. 15, February 1922, 14 pp., 8 figs.

A brief account is given of the insects that injure stored grain in Nebraska. These include Coleoptera, *Calandra granaria, C. oryzae, Tenebroides mauritanicus, Silvanus surinamensis, Cathartus advena, C. gemellatus, Laemophloeus minutus, Tribolium confusum, Caenocorse ratzeburgi, Alphitophagus bifasciatus, Tenebrio molitor* and *T. obscurus*; and Lepidoptera, *Sitotroga cerealella, Plodia interpunctella, Ephestia kühniella, Pyralis farinalis,* and occasionally *Celama sorghiella* and *Tineola bisselliella.* The usual methods of control are advocated, including preventive measures, fumigation and heat.

CHAPOULIE (P.). **Pratique de la Lutte contre les Altises.**—*Rev. Agric. Afr. Nord., Algiers,* xx, no. 139, 31st March 1922, pp. 203–206.

Liquid insecticides are considered the only practical and efficient method for treating vineyards where *Haltica* is present in large numbers. In Algeria, preference is given to soluble arsenic salts, generally sodium arsenate, but this substance used alone causes some scorching of the buds and young leaves, and is therefore frequently used in the proportion of 1½ lb. to 100 gals. of Bordeaux mixture. The author recommends the use of calcium arsenate, by mixing 1½ lb. hydrated lime in a solution containing 1½ lb. sodium arsenate, increasing the volume to 100 gals. by the addition of water. The efficacy of these sprays depends largely upon the moment and method of their application. Essential points in successful spraying are promptness in discovering infestation and in treating the infested area. The spray should be applied very early in the morning, while the insects are still in shelter. If the adults have not been successfully killed off and larval infestation follows, this is more difficult to deal with, and two spray applications must be given, one directed upwards and the other sending the spray in all directions. Further applications should be made if the young terminal leaves are found to be infested in July or August.

DE SEABRA (A. F.). **Etude sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xi. Les grandes Espèces d'Insectes ravageurs des vieux Arbres à S. Thomé.**—*Lisbon,* Companhia Agrícola Ultramarina, 1921, pp. 3–8, 3 plates. [Received 4th April 1922.]

The insects that are found working in trunks of old trees are usually considered of minor importance, but it is pointed out that the indirect injury caused by the wounds that form such a favourable medium for fungous diseases is very great, and also that the old appearance of the trunks is frequently the result of insect attack, and is not indicative of the age of the tree.

The Cerambycids dealt with in this paper include *Macrotoma edulis*, Karsch, found in all old plantations in San Thomé ; *Mallodon downesi*, Hope, which is rather less numerous and apparently only frequents large trunks already infested by other insects ; *Ancylonotus tribulus*, F., evidently introduced from Africa, and occurring on almost all plantations in the Island; and *Sternotomis rufozonatus*, Fairm., common throughout the Island.

DE SEABRA (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xiii. Sur l'Existence du *Microcerotermes dolichognathus*, F. Silvestri, à S. Thomé.**—*Lisbon*, Companhia Agrícola Ultramarina, 1921, pp. 11–13, 1 plate, 6 figs. [Received 4th April 1922.]

A termite, distinct from *Microcerotermes theobromae*, has recently been observed in San Thomé occurring in trees ; it is thought to be *M. dolichognathus*, which has not previously been recorded from the Island.

DE SEABRA (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xiv. Le *Toxoptera coffeae*, Nietner, à S. Thomé (*Toxoptera coffeae thomensis*, s. sp. n.).** —*Lisbon*, Companhia Agrícola Ultramarina, 1921, pp. 15–18, 9 figs. [Received 4th April 1922.]

On comparing *Toxoptera coffeae*, Nietn., described by Theobald from Africa [*R.A.E.*, A, v, 456], with individuals taken in San Thomé, certain differences are observed that warrant the creation of a new subspecies, which is here described as *T. coffeae thomensis*.

DE SEABRA (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xv. Les Termites des Plantations de Cacaoyers. Etude agricole.**—*Lisbon*, Companhia Agrícola Ultramarina, 1921, pp. 3–11, 7 plates, 11 figs. [Received 4th April 1922.]

The most important termite occurring in San Thomé is *Neotermes gestroi*, Silv., the only species that damages trees, killing the trunks and branches, which it enters by means of old wounds caused by *Microcerotermes dolichognathus*, Silv. Less important species commonly observed in the cacao plantations are *Neotermes pallidicollis*, Sjöst., *Schedorhinotermes putorius*, Sjöst., *Termes ostentans*, Silv., *Cephalotermes rectangularis*, Sjöst., *M. parvus theobromae*, Hav., and *Mirotermes amaralii* [*cf.* *R.A.E.*, A, viii, 492–3].

DE SEABRA (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xxi. Description d'un Psyllidae Ravageur des Feuilles et des jeunes Fruits des Cacaoyers.** —*Lisbon*, Companhia Agrícola Ultramarina, 1920, pp. 3–6, 4 figs. [Received 4th April 1922.]

Among the pests of cacao observed at San Thomé is a Psyllid, probably belonging to the genus *Psylla*, but which it has been impossible to identify. Its principal characters are described. The form of injury is very similar to that produced by *Euphyllura olivina* (*Psylla oleae*) among olive trees in Europe, causing the death of the young shoots, leaves and newly formed fruits, and often preceding some serious fungous disease. This pest may become as important as *E. olivina* is in Europe if measures are not promptly taken against it.

de Seabra (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xxii. Le** *Cosmopolites sordidus*, **Germ., à S. Thomé.**—*Lisbon*, Companhia Agricola Ultramarina, 1920, pp. 3–7, 3 figs. [Received 4th April 1922.]

An account is given of *Cosmopolites sordidus*, Germ. (banana borer) as occurring in San Thomé, where it has been known as a pest since 1907. Other insects infesting bananas in the Island are the weevil, *Temnoschoita quadripustulata* (*Sphenophorus quadrimaculatus*), and *Dactylosternum profundus*, a Hydrophilid beetle that appears to be attracted by the decomposing tissues of the plant.

As Doenças das Plantações de Cacau das Ilhas de S. Tomé e Principe. [The Diseases and Pests of the Cacao Plantations in the Islands of S. Thomé and Principe.]—*Lisbon*, Companhia Agrícola Ultramarina, 1921, 142 pp., 30 plates. [Received 4th April 1922.]

This is a comprehensive review of the diseases and insect and other enemies of cacao in San Thomé and Principe. It contains a list of 163 insects, both noxious and beneficial, found on the estates of the Companhia Agrícola Ultramarina [*R. A. E.*, A, viii, 491–493; ix, 57–58]. A number of others are being studied.

Un Nemico delle Talee inestate nel Vivaio. [An Enemy of Grafted Vine Slips in the Nursery.]—*Boll. di Trento.* (Abstract in *Riv. Agric., Parma*, xxvii, no. 13, 31st March 1922, pp. 196–197.)

Nurseries of grafted vine slips in the Trentino region have suffered more or less severe losses due to the Tenebrionid beetle, *Helops lanipes*, the larva of which lives in the ground for two years. It feeds on the leaves and on the buds, and may cause losses of 70–75 per cent. In France naphthaline is sprinkled along the rows and well mixed with the soil. Carbon bisulphide may be injected in the plots during the period when they are empty.

Barreto (B. T.). **Insects Injurious to the Sugar Cane in Cuba.**—*Rev. Agric., Comm. y Trabajo, Havana*, iii, no. 10, 1920, pp. 371–374, 5 figs. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 7, July 1921, pp. 927–928.) [Received 4th April 1922.]

On one estate practically all the cane-fields were infested with *Pseudococcus sacchari* and *P. calceolariae*, but only 15–20 per cent. of the canes had been attacked, the chief injury being done to those planted to fill up gaps. In this case the Coccids were probably present on the canes before planting. The most efficient remedy is to burn the field and plough it up, but this should only be resorted to in extreme cases. It is necessary to wait at least two months before replanting. In some of the affected fields the eggs and larvae of Scarabaeid beetles were abundant. The larvae can be exposed by working the ground and may be collected or left to birds. The adults should be shaken from fruit trees, on the foliage of which they live, on to sheets, or the leaves may be sprayed with lead arsenate. Light-traps are also useful against the adults.

MOREIRA (C.). **Entomologia Agricola Brazileira.**—*Minist. Agric. Ind. Comm., Inst. Biol. Defesa Agric., Rio de Janeiro*, Serie Divulgação, Bol. 1, 1921, 182 pp., 25 figs., 60 plates. [Received 3rd April 1922.]

In this bulletin on the pests of agriculture in Brazil the various injurious insects are divided according to their food-plants, and while the measures appropriate to each case are described, insecticides and their use are treated more fully at the end of the work. Most of the information has already been noticed from previous publications by the author and others, but this volume incorporates a mass of scattered information and is thus, of practical value. The copious illustrations are mostly reproductions of photographs.

DE STEFANI (T.). **La Sulla ed alcuni dei suoi Insetti dannosi.** [Maltese Clover and some of its Insect Pests.]—*Allevamenti, Palermo*, iii, no. 3, March 1922, pp. 85–86.

Maltese or soola clover (*Hedysarum coronarium*), a most important forage plant in hot countries, is severely injured in Sicily by a Buprestid, *Sphenoptera lineata*, F., which oviposits on the young plants. The larvae live in the roots and are protected against damp by the sealing of their entrance-holes, in the main root near the collar, with debris and excreta. Transformation into the adult stage occurs during the winter. The beetle emerges with the advent of warm weather. The clover is not attacked during the first year after sowing, probably because the main root is too slender, and as the crop is cut in May and June of the second year, the complete cycle from egg to adult must take place in about nine months, from September or October to May or June. There is no known remedy, but the destruction of infested plants from February to April should decrease the number of individuals. In Tunisia an allied species, believed by Marchal to be *S. laticollis*, Oliv., does similar important damage. *Aegeria (Sesia) ichneumoniformis*, S.V., is a Lepidopterous pest infesting the roots of clover in Sicily.

BOAS (J. E. V.) & THOMSEN (M.). **Oldenborrernes Optraeden i Danmark i Aarene 1904–1919.** [Cockchafers in Denmark in 1904–1919.]—*Den Kgl. Veterinaer- og Landbohøjskole Aarsskrift, [Copenhagen]*, 1922, pp. 56–65. [With a Summary in English.]

In a paper published in 1904 the varying occurrence of *Melolontha melolontha (vulgaris)* and *M. hippocastani* in Denmark from 1887 to 1903 was recorded. The present work covers the period from 1904 to 1914 and is compiled from the official returns. The previously noted decrease of *M. melolontha* has continued, the brood appearing in the adult stage in the year preceding leap-year having now almost ceased to exist, while another brood, appearing in the year before this, has also decreased, though not to the same extent, so that the damage done by the larvae is of local importance.

M. hippocastani, which has a five-year generation in Denmark, is found in many parts of Jutland, expecially Vendsyssel, where the brood appearing in the adult stage in the years ending with 1 and 6 is the most important—or at any rate was so a few years ago.

BONDAR (G.). **Os Insectos damninhos. XX. Cahida prematura dos Cocos causada pelo** *Homalonotus coriaceus*, **Gyllenhal.** [Injurious Insects. XX. The Premature Fall of Coconuts due to *H. coriaceus*.]—*Chacaras e Quintaes, S. Paulo*, xxxv, no. 3, 15th March 1922, pp. 205-208, 5 figs.

A healthy coconut palm should produce at least fifty nuts a year, but this minimum is often reduced to ten nuts from a very small number of clusters. Other clusters die prematurely or lose their fruit. The cause of this is a Curculionid, *Homalonotus coriaceus*, Gyll., the adults of which live in the axillae of the leaves, chiefly of those protecting the inflorescence. They mine the bracts in order to feed on the unopened flowers. If there are 10–15 holes in a bract, the entire flower cluster within is killed; such extensive injury is, however, exceptional. When the fruits are newly formed, they are pierced by the weevil, which sucks the sap. Such fruits drop, many of them being holed in four or five places. Furthermore, the female oviposits in the coconut palm, preferably in a bract where feeding has occurred. About four or five eggs are laid in the bract, and one or two of these develop. The larva first feeds on the bracteal tissues, but soon passes to the floral peduncle, and then descends to the trunk. The sap-channels leading to the flowers and fruits are obstructed, and the nuts fall prematurely. If the larva attains maturity before reaching the base of the peduncle, it makes a case in the cavity where the peduncle was situated and pupates. Otherwise the larva mines the trunk where it is enveloped by the leaves. When the latter fall, the mines appear in the form of superficial furrows about $1\frac{1}{5}$ inch wide by $1\frac{1}{5}$–8 inches long. This is a sure indication of the presence of the pest in a coconut plantation, and the number of mines denotes the gravity of the attack. A palm with more than ten mines to three feet of trunk is likely to yield nothing in the year in which the infestation occurs. Tall palms are less subject to attack.

For the present no advice can be given regarding insecticides. It is suggested that the larvae and adults should be searched for in the palms about four times a year and killed. As the adult cannot fly well this should have a permanent result.

SCHELLENBERG (A.). **Die Bedeutung der Reblausversuche von Prof. Dr. Schneider für den Weinbau der deutschen Schweiz.** [The Import of Dr. Schneider's Vine Louse Experiments to Viticulture in German Switzerland.]—*Schweiz. Zeitschr. Obst- u. Weinbau, Frauenfeld*, xxxi, no. 7, 8th April 1922, pp. 102–106.

Dr. Schneider-Orelli's experiments have proved that some American vine stocks, planted in the open, are resistant to *Phylloxera* as found in Zurich [*R.A.E.*, A, x, 79]. It is, therefore, no longer necessary to aim at combating the Aphid. The object to be attained is the reconstruction of infested and threatened vineyards before the injury becomes such as to necessitate their compulsory destruction. Local legislation needs amending in accordance with this new principle.

DEAN (G. A.). **How we may increase the Effectiveness of Economic Entomology.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 44–53.

To maintain the entomologist's present position of service and to make the solution of future problems possible, fundamental training for research will have to be insisted upon, and an agreement must

be reached as to which are the basic problems of research and which are the most promising methods of attack. Co-operation is also essential not only among entomologists and between them and other scientific men, but also with public and private agencies and the general public. Conferences and field meetings would seem to be the best means of promoting co-operation for those workers engaged on similar problems. It is considered that the present opportunities are most promising in this respect.

KELLY (E. G.). **Cooperation of Agricultural Colleges with High Schools and Rural Schools in Economic Entomology.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 54–62.

The work carried out by the Kansas agricultural college, in co-operation with high schools and rural schools during 1921 is discussed, and the advantages of such co-operation in economic entomology are emphasised. Extension schools for the study of entomology have been organised in fourteen counties in Kansas. The extension entomologist is to attend these schools and give demonstrations in spraying, and illustrated lectures on some of the economic pests. The members of the agricultural class and farmers are to be given definite entomological work that they may do either as teams or as individuals.

HADLEY (C. H.). **Outline and Progress of Work being conducted against the Japanese Beetle,** *Popillia japonica*, **Newm.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 62–66.

During 1921 the work in connection with *Popillia japonica*, Newm., was carried out mainly along the lines suggested in the previous season [*R.A.E.*, A, x, 43]. During this time the beetle has apparently spread considerably, the infested area at the end of 1921 amounting to about 213 square miles in New Jersey and 57 in Pennsylvania, whereas at the end of 1920 the figures were 92 and 11. There appear to be no isolated infestations remote from the main one, and the spread may therefore be considered to be the natural and normal one of the imported insect in its new environment. It appears that the chances of distribution of the beetle by products other than maize are no greater than by other agencies that it is impossible to control, and the quarantine has therefore been revised and is effective from 1st January 1922. This quarantine restricts the movement of sweet maize, lettuce, cabbage, grapes, hay and straw.

As a result of the biological observations now in progress, it has been found that contrary to previous belief the larvae of *P. japonica* may under some conditions become a serious source of injury. Their distribution is not limited to the heavier types of soil, and they may occur in practically any type of soil represented in New Jersey or Pennsylvania that will support vegetation. The damage caused by the adults as a result of their habit of feeding on the foliage of orchard and shade trees is of considerable importance. Under some conditions they may also become important pests of vegetables. Investigations with regard to biological control are progressing favourably. A large number of two species of parasites have been received from Japan, one of which at least will apparently be able to survive the conditions existing in the Riverton district. There is also every possibility that certain parasites of white grubs [*Lachnosterna*], introduced from Illinois, may become useful factors in the natural control of the Japanese beetle.

Investigations with regard to the artificial control of the larvae and the adults have also been continued. Under certain conditions a contact spray of a sodium soy bean soap has given satisfactory results against the adults.

MOORE (W.). **The Reaction of the Japanese Beetle to Arsenical Spray Deposits.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 67–71.

From the experiments here described, which were carried out in 1920 and 1921, it is evident that *Popillia japonica*, Newm., is repelled by lead arsenate as a result of the toxic effects produced by it. A certain percentage of the beetles may, however, be killed under field conditions by the use of large quantities of the poison evenly distributed over the foliage ; in the case of sprays this result may be obtained by the use of flour, glue or gelatin. These materials probably increase the efficacy of the poison by coating the particles of the arsenical. The efficacy of arsenicals for large-scale control in the field has still to be proved.

SANDERS (G. E.) & KELSALL (A.). **Cheaper Arsenicals and their Use.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 71–75.

The efficiency of calcium arsenate and white arsenic as compared with other arsenical products is discussed. Calcium arsenate cannot be safely used alone or in combination with dusting sulphur on apple or other tender foliage, but with these exceptions, it is equal or superior to lead hydrogen arsenate for ordinary uses. In using lead arsenate the greatest safety is obtained by adding about 2 lb. of hydrated lime to 1 lb. of dry lead arsenate in water before adding to the lime-sulphur solution, and 2 to 3 lb. of hydrated lime should be used to every pound of calcium arsenate. Both may be put directly into the lime-sulphur solution. For use in alkali sulphide and polysulphide solutions calcium arsenate is superior to all other arsenicals. It is also the best material for dusting on such crops as potatoes, cotton, etc. The efficacy of white arsenic as an insecticide or for use in poison baits depends chiefly on the fineness, purity being a secondary consideration. A quick reacting material should be used with an even fineness and capable of passing a screen of 200 meshes or more to the inch. One pound of white arsenic and 1 lb. of hydrated lime mixed with 10 imperial gals. of water in which a sack containing 10 lb. of crystal copper sulphate has been suspended, has been used with success on potatoes and apples. The mixture should be stirred occasionally until the copper sulphate has dissolved. This poisoned stock solution is diluted and added to a lime solution that is equally diluted. For potatoes it was used in the strength of 4 : 4 : 40 and 5 : 5 : 40 and for apples 3 : 10 : 40. The cost of copper arsenic dusts may be reduced by substituting burned lump lime for hydrated, finely crystallised copper sulphate for dehydrated, and white arsenic for calcium arsenate.

HEADLEE (T. J.) & RUDOLFS (W.). **Some further Experience with Contact Dusts.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 75–81.

The work here described was carried out against the pink and green aphis, *Macrosiphum solanifolii*, under field conditions. The two great

disadvantages of nicotine delivered as a dust are that rain falling within the first 72 hours seems to reduce, if not entirely stop, its action, and the cost is greater than that of a substance that is as effective when delivered in a spray form. A 2 per cent. nicotine clay calcium oxide dust kills 87 per cent. of the Aphids, while under the same conditions, the spray will kill slightly over 85 per cent. A 1 per cent. nicotine calcium oxide dust kills nearly 84 per cent. The maximum efficiency of the dust is reached between 24 and 72 hours after application whilst the spray reaches a high point of toxicity within 24 hours, a great deal being accomplished within the first two hours. The great advantages of the dust are the greater speed with which it can be applied and the independence of a water supply. As a result of experiments with various carriers of the dust it was found that none of the mixtures throw off 25 per cent. of the nicotine within the first 72 hours. Although a mixture of clay and calcium oxide appears to be one of the most effective substances in the field, it only throws off about 4 per cent. within the period of toxicity. The amount of calcium oxide used in the field was at least 8½ per cent., whereas in the laboratory tests only 5 per cent. was used. The improvement of the nicotine dust is to be sought in the more rapid evolution of the 2 per cent. or less of nicotine, which is within the range of reasonable practice, or in the delivery of such nicotine as is evolved in close contact with the bodies of the Aphids, or in developing along both these lines.

PARROT (P. J.). **Control of Sucking Insects by Dusting.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 1, February 1922, pp. 82–85.

This paper summarises the results of experiments in continuation of previous work [*R. A. E.*, A, ix, 352] with special reference to the susceptibility of apple red bugs and various Aphids. Dusting mixtures containing 0·25, 0·5, 1·0 and 2·0 per cent. nicotine proved toxic to *Lygidea mendax*, Reut. (apple red bug) and *Heterocordylus malinus*, Reut. (dark red bug). On the average more uniform results were obtained with the preparations containing the highest amounts of nicotine. The cost of high dosage may be avoided by the careful and liberal application of dusts containing 0·5 or more per cent. The disadvantages of dusts over sprays have already been noticed [see preceding paper]. In large commercial orchards dusting might be of great advantage in a capacity supplementary to the usual spraying.

Against *Myzus ribis*, L. (currant aphis), a spray consisting of 1 U.S. pt. nicotine sulphate, 100 U.S. gals. water and 6 lb. soap was used. The dusting preparations contained 0·5, 1·0 and 2·0 per cent. nicotine respectively in a carrier of sulphur lead arsenate (90–10). Three treatments were applied at the rate of 1 lb. per bush or 2 gals. of the spray per bush. Both dusting and spraying mixtures afforded efficient protection. The condition of the foliage dusted with 0·5 per cent. nicotine was not quite as satisfactory as in the cases where 1 or 2 per cent. was used. Similar sprays and dusts were also used against *Brevicoryne* (*Aphis*) *brassicae*, L. (cabbage aphis). The most satisfactory mixture appears to be a calcium hydrate preparation containing 2·0 per cent. nicotine applied at the rate of 20 lb. per acre with a hand-bellow duster. Excellent results were obtained with two applications. From 35 to 40 lb. of material were required to produce effective control with power dusting machinery. Nicotine sulphate 5 lb., powdered lead or calcium arsenate 15 lb. and hydrated lime 80 lb. is the formula advocated against *B. brassicae* and cabbage worms

[*Pieris rapae*, L.]. If the caterpillars are not very numerous, the arsenical may probably be safely reduced to 10 lb.

Macrosiphum solanifolii, Ashm. (potato aphis) appears to be the most difficult species to control. Dehydrated copper lead arsenate containing 2 per cent. nicotine used at the rate of 50 lb. per acre killed 52·3 per cent. of the Aphids infesting the tips of the growing shoots and 83·2 per cent. when used at the rate of 90 lb. per acre. Nicotine and soap used at the rate of 100 lb. per acre destroyed 85·5 per cent. All applications appreciably checked the rapid development of the Aphids on the growing shoots and apparently afforded noticeable protection to the leaves.

De Long (D. M.). **The Boom Nozzle System and the Traction Duster as Factors in Grape Leaf Hopper Control.**—*Jl. Econ. Ent.*, *Geneva, N. Y.*, xv, no. 1, February 1922, pp 87-90, 1 plate.

During 1920 and 1921 great damage was caused to grapes along the south-eastern shore of Lake Erie by *Typhlocyba* (*Erythroneura*) *comes*, Say. The attacked foliage dried prematurely and curled up before the grapes had ripened, causing them to have a red appearance and sour flavour and thus diminishing their market value. Owing to the unsatisfactory results obtained with the existing arrangement of the spraying nozzles, a new method has been devised, which promises better results. In the new arrangement the driver sitting on the spray tank holds a ⅝-inch horizontal pipe about 7 feet long, connected with the spray tank and extending over the top of the row. From the horizontal pipe a 3-foot pipe connected by 3 feet of rubber hose extends vertically almost to the ground on either side of the row at a distance of about 3½ ft. apart. Seven disk nozzles were used. One was placed pointing downwards from the horizontal pipe midway between the vertical pipes and directly over the grape row; three on each of the vertical pipes; one at the extreme lower end pointing upwards at an angle of about 45°; another about 1½ ft. above directed upward and slightly backward; and one about 3 ft. from the bottom directed upward and slightly forward. The nozzles were attached by means of " T's " and an " L " in the case of the extreme lower one. The spreading of the vertical pipes was prevented by attaching a weight to the end of each. The upper nozzles on the vertical pipes were found to be unnecessary. The main points in the construction of this apparatus are that the lower nozzle must be as close to the ground as possible as the lowest portions of the plants are often most heavily infested by the nymphs; the nozzle should be upturned at an angle of approximately 45°, which however will vary with the vineyard, a difference of 5° often causing 15 to 20 per cent. difference in the killing; the lateral nozzles should be alternated slightly forward and backward. One of the great advantages of this arrangement is that the upturned nozzles lift the leaves and thereby thoroughly cover the lower surface. As compared with the trailer method the chief advantages are the reduced time and expense.

Experiments with the traction duster have given varied results. A 2 per cent. nicotine dust used with both Bordeaux and lime and applied at the rate of 60 lb. and more per acre killed both the adults and nymphal stages, but the same treatment applied to another plot the following evening gave very inferior results. The difference may have been entirely due to the temperature and humidity conditions, and there may have been a difference in the percentage of nicotine

in the mixture. Further experiments are required to determine the conditions of killing, but at least an economic control has been obtained by the dust on some plots.

BRITTAIN (W. H.). **The Apple Sucker** (*Psyllia mali*, **Schmidberger**).—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 96–101.

Psylla mali, Schmid., is known to occur in Austria, the Caucasus, Czecho-Slovakia, England, Ireland, Germany, the central and northern part of old Russia, Norway, Sweden, Denmark, Holland and Nova Scotia. It has also been recorded from Japan and France, but it is not known to be present in injurious numbers in either of these countries. From a practical standpoint the apple may be considered as the sole food-plant, although this Psyllid has also been found breeding on European mountain ash (*Sorbus aucuparia*), and it occasionally attacks pear and quince.

Its bionomics and control in Nova Scotia are discussed. The injury is done almost entirely by the nymphs. Both the leaves and the blossoms are attacked, but the latter are apparently preferred. Under a heavy infestation the blossoms shrivel and die, but remain hanging to the tree for some time. The injury seems to be due to the withdrawal of sap from the blossoms. Injury to the foliage may cause brown withered leaves that remain on the trees throughout the summer, green leaves that are shed in showers about the end of June, or yellow leaves, which may begin to fall in mid-June and continue for several weeks. Injury similar to the last mentioned, but greatly aggravated, is also caused by spraying the injured trees with Bordeaux mixture or dusting with copper lime arsenate. The work of the insects apparently renders the foliage particularly susceptible to spray injury. Hatching occurs on the earliest opening varieties first, the difference sometimes amounting to four or five days, though the emergence does not entirely correspond with the state of the development of the buds. In 1921 the first individuals emerged one week later than *Aphis pomi*, De G., and eleven days before *Lygus communis*, Knight. The nymphal stage lasts from 31 to 36 days. Oviposition does not take place until August or September and continues until frosts set in. The eggs are mostly laid upon the smaller fruit spurs or shoots; they may occasionally be found on nursery stock. The adults feed very little and do no apparent injury, but they have a tendency to spread into shade or forest trees surrounding the orchard, returning to the latter for oviposition. Orchards sprayed in the spring are thus often reinfested by these adults.

The natural enemies include birds, ants and other predators, but none of these are of any practical significance. The fungus *Entomophthora sphaerosperma* appears to exercise the most effective check over limited areas.

Nursery stock may be fumigated with hydrocyanic acid gas in the same way as for San José scale [*Aspidiotus perniciosus*, Comst.]. Though exposure for only one hour destroyed all individuals in some cases, others survived an exposure of nine hours to the same strength of gas. Fumigation is, however, more effective in the spring than in the autumn. Carbon tetrachloride even after prolonged exposures failed to give satisfactory results. Dipping also proved more effective in the spring than in the autumn, the best results being obtained with a 5 per cent. (by volume) carbolineum emulsion. Dipping as applied to nursery stock has many disadvantages compared with gas treatment.

For the dormant spray in orchards 100 lb. lime, 30 lb. salt and 100 gals. water are advocated. This wash should be applied as late as possible before the eggs hatch, and acts chiefly as a mechanical barrier to the hatching, but the salt may also have some direct effect, as its omission lessens the effectiveness of the wash. The best results were obtained with two applications. The nymphal stage is the one most susceptible to sprays and may be treated when the flower stalks have separated out by careful spraying with ¾ pt. nicotine sulphate to 100 gals. water. A weaker solution would probably be effective but has not yet been tried. Very good results were also obtained with a dust containing 2 per cent. or more nicotine sulphate (40 per cent. nicotine) with sulphur as a base. The effectiveness was increased by the addition of lime. Clay used in place of sulphur gave inferior results. The sprays and dusts used against the nymphs were also effective against the adults. Under favourable conditions the adults were killed by fumigation with waste tobacco, free from incombustible material, at the rate of 360 lb. to the acre. Numerous small fires are better than a few large ones ; it is also advisable to have a number of unlighted heaps in reserve in the case of change in the wind, when they may be transferred to the windward side of the orchard. The fires once started will continue burning even through a heavy shower, but unlighted heaps should not be left in the wet, as a large part of the nicotine is thereby extracted. This treatment should be deferred as late as possible before oviposition. In spite of the success of these treatments under experimental conditions, reinfestation always occurred from without, and good results can only be expected over a large area by co-operative efforts.

FROST (S. W.). **The False Apple Red-bug** (*Lygidea mendax*) **in Pennsylvania.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 102–104, 1 fig.

Though the eggs of *Lygidea mendax*, Reut. (false apple red-bug) apparently hatch earlier in most years than has been generally supposed, the spray made in the pink stage of the blossom comes too early to control the nymphs. During 1920 and 1921 the injury from this Capsid was particularly severe. *Heterocordylus malinus*, Reut. (true red-bug) also occurs, but to a very much less extent, and cannot at present be considered a serious pest of apples, at least in Pennsylvania. Sprays must therefore be timed against *L. mendax*.

The nymphs appear shortly after the colour is showing in the cluster-buds. As a result of the observations during 1917 to 1921 in Pennsylvania, the eggs appear to hatch after the pink stage of the buds. The same relation of bud development and insect activities exists even under extreme conditions such as occurred in the abnormal year of 1921. From the spraying experiments carried out throughout the State, it is evident that two sprays are necessary for satisfactory control. In ordinary seasons these should be applied when two-thirds of the petals have fallen and about two weeks later, when the apples are about the size of hazel nuts.

Report of Meeting of Cotton States Entomologists, Dallas, Texas, Nov. 30–Dec. 2, 1921.—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 105–112.

The camphor scale [*Pseudaonidia duplex*] seems to be of little importance in Japan, where it occurs on citrus stock. Outside Japan it is

only known to occur in New Orleans, where it was apparently introduced on roses and has spread very rapidly [*R. A.E.*, A, x, 73]. During a severe storm, scales were blown to a point two miles from the original infestation. A survey showed that about four square miles are infested. Outside the original infested area 450 isolated infestations were found, all of which were cleaned up. During a series of experiments to find a satisfactory spray, lime-sulphur, miscible oils and numerous other preparations were tried without success. Eventually all the trees in the infested area were defoliated by pruning out all the branches and limbs bearing leaves, and the trees were sprayed with a 2 per cent. emulsion consisting of 2 lb. potash fish-oil soap, 2 U.S. gals. junior red engine-oil (standard oil product) and 1 U.S. gal. water. This preparation gave 100 per cent. control. It is proposed to spray twice a year. Although very resistant to various spray materials, this scale is particularly susceptible to hydrocyanic acid gas, the gas from one ounce of sodium cyanide to 1,000 cubic feet killing all scales. Plants in flower withstood this treatment for one hour at a temperature of 85–92° F., provided they were placed in the shade after treatment.

The males of this species are always found on the leaves, and the females on the twigs. About 200–250 eggs are deposited over a period of about a month. Ants are generally present in large numbers where the scales occur. About eight species of parasites and predators have been found, but it is doubtful whether they cause a two per cent. mortality. It only requires a few scales to cause complete defoliation of a twig, and the whole tree may die six months after attack.

There are 172 species of food-plants, the more susceptible of which are camphor, fig, rose, hackberry, elm, and *Citrus*. The injury is not confined to tropical and semi-tropical plants, and this scale must be regarded as a potential pest in latitudes north of New Orleans until the contrary has been proved. A quarantine against it has been in force since June 1921, and includes all territory within a radius of 20 miles around New Orleans. Plants that had left the infested area before the infestation had been discovered are now being traced, but this work is progressing very slowly owing to lack of funds.

A great deal of the information concerning the Mexican bean beetle [*Epilachna corrupta*, Muls.] has already been noticed [*R. A.E.*, A, ix, 374]. It is now certain that it was introduced into Alabama from Utah with lucerne hay. Careful search in Mexico has revealed only one parasite of this beetle, a Tachinid fly. The present range of the beetle includes 36 counties in Georgia, 34 in Alabama, 34 in Tennessee, and 2 in Kentucky, North Carolina and South Carolina.

The chief factors in the control of the sweet potato weevil [*Cylas formicarius*, F.] are the control of seed and slips to be planted in the infested area, and clean cultivation. Eradication work has involved about 900 farms, and out of 300 in Florida only 30 remain infested. Scouting for the pest should be done in the autumn at harvest time, and in the spring when the potatoes are to be bedded. Wild morning glory is an alternative food-plant, but the presence of wild food-plants is of less importance than the climate. Five miles is considered to be ample for a safety zone around an infestation, the main point being to prevent the pest being carried in seed.

The Argentine ant [*Iridomyrmex humilis*, Mayr] causes an annual loss of not less than £5,000,000, and it has been estimated that this is only about one per cent. of what it is capable of doing. Eradication is now being carried out at New Orleans and Baton Rouge on a large scale, about 150 cans of poison being used to a city block. The complete

cost for one treatment is about £2 10s. This work may be done in the autumn or the spring, but the best time is about 15th August to 15th October. After the first year the work should be continued for another two or three years, using about a quarter the number of cans. Complete eradication is considered quite possible.

Heliothis (*Chloridea*) *obsoleta*, F., was found to be more severe in many instances where dusting had been carried out than where it had been omitted; this may possibly be in some way due to the destruction of natural enemies. Dusting should apparently be done early and when the weather is wet. Four or five applications made under the proper conditions should prove profitable. The applications should be made two or three days after the hatching of the bollworms begins.

It has been resolved to urge upon Congress and the legislature of the different southern States the appropriation of ample funds to assure prompt investigation of all suspicious reports of the presence of the pink bollworm [*Platyedra gossypiella*, Saund.]. It has further been resolved to continue the eradication work by the maintenance of non-cotton and regulated zones, which are to be extended wherever necessary, and to urge the adoption of compulsory cotton seed sterilisation. The sterilisation of cotton seed against the larvae is discussed. The thermal death-point was found to be between 130 and 145°F. At a temperature of 130° all larvae were killed in 45 minutes, at 145° in 10 minutes. It was found that seed may be kept at a temperature of 170° for an hour without injuring it, and the germinating quality is apparently improved. It is proposed to test various types of machines in Mexico, and an attempt will be made to require all cotton gins to be equipped with sterilisers.

WAKELAND (C.). **Successful Poisoning of** *Eleodes* **Beetles.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 112-113.

By means of co-operative work over a large area it appears possible to eradicate *Eleodes hispilabris* by the use of poison bran mash during two successive seasons. The adults feed greedily for about a month after emergence, and will readily eat the poison bait even when there is an abundance of unpoisoned food. The bait was as effective after ten days as when first distributed. These investigations are to be continued during the present year.

SMITH (M. R.). **Some Ants noted to infest Houses in Mississippi during the Summer and Fall of 1921.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 113–114.

The following ants are recorded in order of their economic importance as house pests in Mississippi:—*Iridomyrmex humilis*, Mayr (Argentine ant), *Monomorium minimum*, Buck., *M. pharaonis*, L., *Solenopsis geminata*, F., *S. molesta*, Say, *Cremastogaster lineolata*, Say, *Iridomyrmex analis*, Mayr, *Tetramorium guineense*, F., *Solenopsis geminata*, F., subsp. *rufa*, Jerd., and *Camponotus caryae* var. *rasilis*. Brief notes are given on the distribution and habits of these species.

Department of Horticultural Inspection.—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, p. 120.

Nests containing from three to six living larvae of the Pierine butterfly, *Aporia crataegi*, L., have been intercepted at New York in shipments of fruit and rose stocks from France. Manetti rose stocks

from France were infested with *Acronycta rumicis*, L. (sorrel cutworm), and from England, France and Holland with *Emphytus cinctus*, L. *Cylas formicarius*, F., was intercepted in sweet potatoes from Haiti, while others, from Barbados, were infested with *Euscepes batatae*, Waterh.

WALLACE (F. N.) & others. **Report of the Division of Entomology.**—*3rd Ann. Rept. Indiana Dept. Conservation, 1920-21, Indianapolis*, 1922, pp. 37-57.

Greenhouse pests included whitefly [*Aleurodes*], against which hydrocyanic acid gas has been successfully used, as has nicotine oleate, which is prepared by mixing 1¾ pts. of commercial or technical oleic acid or "red oil" with 2¼ pts. nicofume liquid, 1 fluid oz. of this mixture being used to 2 U.S. gals. soft water. A brief account is given of the greenhouse leaf-tyer [*Pionea rubigalis*], which may be killed by fly switches and light-traps. Plants subject to attack should be sprayed on the lower surface of the leaves with 1 oz. lead arsenate to 1 U.S. gal. water, adding 1 oz. cheap laundry or fish-oil soap. Spraying with 1 part Black-leaf 40 to 500 parts water, with 1 oz. fish-oil soap to each U.S. gal. water, or with 1 fluid oz. nicotine oleate to 2 U.S. gals. water is effective against chrysanthemum midge [*Diarthronomyia hypogaea*]. Spraying should begin six to eight weeks before cuttings are to be made and be done twice a week. Nicotine oleate will also control mealy-bugs [*Pseudococcus*] and greenhouse orthezia [*Orthezia insignis*].

Two new infestations of strawberry root worm [*Typophorus canellus*] were undoubtedly due to shipments of infested plants from the east. The beetles hide by day and feed at night, chewing young leaves or the bark of the new shoots. Arsenical sprays or dusts have not been successful, as the adults will not eat treated foliage. Hand-picking in the late afternoon and early morning has given fair results, the best time being when the plants are breaking into growth after the summer resting period. The removal of all soil from the benches of infested greenhouses during this period is the most certain though the most drastic method. In this case the walks should be treated with a strong contact insecticide such as kerosene emulsion. The larvae may be destroyed by removing about three inches of soil from the benches in this period, and this treatment must be coupled with hand-picking.

Remedial measures recommended for rose midge [*Neocerata rhodophaga*] include nightly fumigation with nicotine papers or tobacco stems for two to three weeks, keeping the benches covered with ¼ to ½ in. tobacco dust, which must be renewed as it becomes wet. Daily picking of infested shoots and buds and burning them reduces infestation.

During the end of September and beginning of October greenhouses were invaded by cabbage looper [*Phytometra brassicae*], corn-ear worm [*Heliothis obsoleta*] and the yellow-striped army worm [*Prodenia ornithogalli*]. All these caterpillars show a decided preference for the buds and flowers of plants, the chief damage being done to chrysanthemums, roses, carnations and geraniums. Remedial measures are spraying with 1 oz. lead arsenate, 1 oz. cheap laundry or fish-oil soap and 1 U.S. gal. water. If objection is made to the white deposit left by this spray, 1 pt. lead arsenate and 1 pt. cheap flour can be dusted

on the plants. Hand-picking is beneficial. Where *P. ornithogalli* occurs alone, hand-picking in the late afternoon is recommended, or a poisoned bran mash may be used consisting of 5 lb. bran and ¼ lb. Paris green mixed together and moistened with ¾ U.S. gal. water into which has been mixed lemon juice and 1 U.S. pt. cheap molasses. A small quantity of this bait should be placed among the infested plants in the late afternoon.

The cyclamen mite [*Tarsonemus pallidus*] is a comparatively new pest, but a serious one, as it dwarfs the injured parts of the plants. Nicotine oleate and tobacco dust have given fair results.

Owing to the spread of *Pyrausta nubilalis* (European corn borer) Indiana had been listed as a State to be quarantined against the importation of maize, grain or vegetables likely to carry this moth, but this was eventually cancelled by the Federal Horticultural Board. In the year under report *Heliothis obsoleta* (corn ear worm) was a far more serious pest to maize and other crops owing to the fact that the warm period early in the spring caused the adults to emerge sooner, so that the first generation was four or five weeks ahead of the growing season for maize. The second generation developed a little later than the first brood does in normal seasons and in far greater numbers. Instead of hibernating as pupae, the moths emerged, and a full third brood came in time to work on the field maize and late sweet maize.

Against ants in houses a poisoned syrup, made by boiling together 10 pts. sugar to 100 pts. water, adding 1 pt. tartar emetic is effective. A small quantity of this should be placed in shallow dishes containing a sponge.

HARNED (R. W.). **Annual Report of the Entomology Department.** —*34th Ann. Rept. Mississippi Agric. Expt. Sta. 1920–21, Agric. Coll., Miss.*, 1921, pp. 27–32. [Received 11th April 1922.]

During 1920 and 1921, a systematic and biological study was made of the Coccids of Mississippi, and also of the insects affecting pecans, of which there are about fifty, especial attention having been given to the hickory bark-beetle [*Scolytus quadrispinosus*], while the importance of *Lachnosterna* (May beetles) as pecan pests has been the subject of a fresh investigation. Twenty-five species of *Lachnosterna* have been found, twenty of which were taken feeding on pecan trees. *Laphygma frugiperda* (Southern grass worm), and its parasites have been reported upon elsewhere [*R.A.E.*, A, x, 194]. A survey of infestation by the cotton boll weevil [*Anthonomus grandis*] showed about 30 per cent. of parasitism in some localities, while in others no parasites were found. Many species of parasites were obtained, the majority of which have not yet been identified.

MARCOVITCH (S.). **Grasshoppers of Tennessee.**—*Tennessee State Bd. Ent., Knoxville,* Bull. 33 (ix, no. 2), June 1920, 112 pp., 33 figs. [Received 11th April 1922.]

The Orthoptera occurring in Tennessee are described, and keys are given to the genera and species. The habits are discussed and remedial measures are suggested for the species that may prove to be injurious. An extensive bibliography and a glossary of the terms used in the text are included.

RILEY (W. A.). **Division of Entomology and Economic Zoology.**—*29th Ann. Rept. Minnesota Agric. Expt. Sta., 1920–21, Univ. Farm, St. Paul,* 1921, pp. 55–60. [Received 11th April 1922.]

Experiments with baits showed that bran and molasses were very attractive to cutworms, but the addition of fruit essence did not increase the attractiveness. Tests with stored products are being continued to determine the fatal high and low temperatures for insects. Cultures kept at a temperature of 80·6° F. show that *Tribolium confusum*, Duv. (confused flour beetle) has distinct dietary limitations, which may be measured by recording either the death-rate or the time of metamorphosis. The death-rate curve of beetles in a "synthetic flour" is almost identical with that in wheat flour, but the metamorphosis shows a retardation of ten days or more when compared with a culture of wheat flour. These insects will therefore be used to indicate certain dietary deficiencies in wheat flour substitutes, etc., as soon as more data are available. The numbers of *Tribolium* seem to be distinctly reduced by the presence in the body cavity of a coelomic *Coccidium*, which is being investigated.

In forest entomology, experiment has shown that insects working in logs are much more subject to the action of external physical factors than was formerly supposed. Logs in deep shade are apparently less liable to injury by the more serious pests than those in more open situations. This is partly due to a retarding of the rate of development in a shady place and partly to the fact that fewer eggs are deposited in logs under very shady conditions. This suggests the possibility of shading logs to protect them from insect attack. It has been shown that the subcortical temperature of logs exposed to the sun may rise to 140° F. or more [*R. A. E.*, A, viii, 365], and in some logs the temperature on many bright summer days will pass above the point fatal to insects. This, however, is not true of all logs. The temperature beneath the bark is governed by light intensity, angles of incidence of the sun's rays and many other factors. White pine logs often reach very high temperatures, while Norway pine logs are comparatively cool.

During a study of the specific toxicity of various arsenicals, it was found that all the common metallic arsenicals may be made into a form that carries a positive electric charge when wet, examples being lead, zinc, copper, calcium, magnesium, chromium, iron and aluminium. Acid arsenicals, such as acid lead arsenate, cannot be made with a positive charge without first converting them into the basic form. Most metallic arsenicals with a positive charge can only be obtained by the use of a salt of the metal and a weak acid. Basic lead arsenate will not adsorb an ion of the metal from lead nitrate, but will form lead acetate. In general it is not yet understood whether the metallic ion is adsorbed by the metallic arsenical, or whether the latter adsorbs a metallic hydroxide or oxide complex. Possibly both reactions occur, but sufficient data are not available to state definitely what actually takes place.

In a shipment of 3,000 narcissus bulbs from Holland in 1919, 20 per cent. were found infested with the narcissus fly, *Merodon equestris*, F.; some also showed infestation with larvae of the lunate onion fly, *Eumerus strigatus*, Fall. This is a serious pest of onions in Europe, and it is feared that some may have escaped interception; if so they will constitute a new onion pest in Minnesota.

SMITH (H. S.). **Report of the Bureau of Pest Control.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, x, no. 11–12, November–December 1921, pp. 570–597, 10 figs. [Received 12th April 1922.]

The organisation and activities of the Bureau of Pest Control are discussed, and the general remedial measures employed in certain cases, such as against the codling moth [*Cydia pomonella*] in walnuts, *Phylloxera* in rooted grape-vines, insects in dried fruit, and potato tuber moth [*Phthorimaea operculella*] in potatoes, are described, with the methods of disinfecting nursery stock, fumigation of *Citrus*, etc.

Field work included dealing with an infestation of *Otiorrhynchus rugifrons* (strawberry weevil) over about 30 acres. The ground was deeply ploughed during late August and allowed to dry in order to kill both plants and larvae. A narrow strip of plants was allowed to remain on the outskirts to act as a trap to check the migration of adult weevils that might have survived the treatment; this will be ploughed during the next larval period of the insect. Complete eradication appears to have been effected by these methods. Work has also been done against *Typophorus* (*Paria*) *canellus* (strawberry leaf weevil) by spraying with arsenicals, and will be reported upon. *Taeniothrips inconsequens* (*Euthrips pyri*) (pear thrips) continues to be destructive in many localities. *Pseudococcus maritimus* (pear mealy-bug) greatly lessens the value of pears by the honeydew deposited while the pears are just ripening. Winter applications of crude oil, miscible oils and distillate oil emulsion aid in keeping down infestation, but do not destroy egg-masses and active stages of the mealy-bugs that are deeply hidden under the rough bark of old trees. Centipedes in asparagus beds are doing considerable damage, in some cases destroying the roots. *Anarsia lineatella* (peach moth) was unusually abundant in several localities, and damaged many late peaches. *Tetranychus telarius* (red spider) caused defoliation of many fruit trees during the growing season.

The biological method as used against certain pests of *Citrus* is reported upon, and an account is given of the use of *Aphycus lounsburyi* against the black scale [*Saissetia oleae*] [*R. A.E.*, A, ix, 191]; of *Cryptolaemus montrouzieri* against citrus-feeding mealy-bugs; and of *Tanaomastix abnormis* against *Pseudococcus citri* [*R. A.E.*, A, ix, 190]. Some difficulty is being experienced in maintaining supplies of the Coccinellid, *Novius* (*Vedalia*) *cardinalis*, against the cottony cushion scale [*Icerya purchasi*], as it survives the north Californian winter with difficulty, and field collections have to be resorted to. Tests are being made to determine which are the most efficient enemies of the red scale [*Chrysomphalus aurantii*], trials being made with *Orcus chalybaeus*, *Rhizobius lophantae* and *Chilocorus bivulnerus*, while observation is being kept on the small golden Chalcid, *Aphelinus diaspidis*, an external parasite, which is present on nearly all of the plots being tested. The numbers of various predators and parasites that have been reared at the laboratory or collected in the field during the period under consideration are shown in a table. In addition to those mentioned above are *Scutellista cyanea*, *Rhizobius ventralis*, *Axion plagiatus* and *Coccophagus lunulatus* against *Saissetia oleae*; and *Sympherobius barberi*, *Scymnus sordidus*, *Hyperaspis lateralis*, *Leucopis bella* and *Pauridia peregrina* against mealy-bugs.

STRONG (L. A.). **Report of the Bureau of Plant Quarantine.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento,* x, no. 11-12, November–December 1921, pp. 614–626, 8 figs.

The work of the Plant Quarantine Service of the Department of Agriculture during the year ending 30th June 1921 is reviewed, and particulars are given of inspection at the various stations. The conclusion is reached that if an adequate measure of protection is to be given against such serious pests as the cotton boll-weevil [*Anthonomus grandis*], pink bollworm [*Platyedra gossypiella*], European corn borer [*Pyrausta nubilalis*], gipsy moth [*Porthetria dispar*], brown-tail moth [*Nygmia phaeorrhoea*], Mediterranean fruit-fly [*Ceratitis capitata*], and others that are liable to be introduced through interior points and at border points, a sufficient number of inspectors must be provided to insure thorough inspection at the border lines and all terminals in the interior, as well as at the maritime ports. Suggestions for the necessary equipment, etc., are made.

NOUGARET (R. L.). **Report of the Viticultural Service.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento,* x, no. 11–12, November–December 1921, pp. 627–642, 2 figs.

The situation in regard to *Phylloxera* is discussed. The small acreage planted with wine grapes is attributed to the prevalence of *Phylloxera vastatrix*, Planch., among them, the necessity for planting on resistant roots, the difficulty of obtaining resistant stock, and the prohibitive regulations of the Federal Horticultural Board governing the importation of grafted rooted vines and rooted cuttings. Any precautionary method to circumvent or retard *Phylloxera* on vines, other than grafting on resistant stock, is only temporary. Hot water is useful as a restriction against dissemination, but it is useless as a preventive. The recommendations are to plant *vinifera* vines in soils that are only slightly or are not susceptible to *Phylloxera*, and to graft *vinifera* vines on resistant stock when planted in susceptible soil.

Experiments with cyanide fumigation against the grape mealy-bug [*Pseudococcus bakeri*, Essig] have given rather unsatisfactory results, and it is suggested that biological methods of control should be tried as a last resort. An efficient parasite already occurs in the vineyards of the southern San Joaquin Valley, namely, the Chalcid, *Pseudaphycus notativentris*, Gir., which parasitises the mealy-bug in the earlier stages of its growth, one parasite to each larva, though from a fully developed adult female as many as sixteen parasites have been obtained. In a few instances the mealy-bug has entirely disappeared from vineyards that had been infested for some years, presumably as a result of the activities of this parasite. There is therefore reason to believe that if it were to be reared artificially in large numbers and distributed where *P. bakeri* causes heavy infestation, the vines might eventually be freed from this troublesome pest.

A condition that is causing increasing damage is root-knot of vines, due to the presence of the Nematode, *Heterodera radicicola*, Greef. The function of the roots attacked by it is greatly impaired, and the growth of the vine suffers in consequence. Sandy soils encourage the propagation and dissemination of this pest, while clay soils are favourable to *Phylloxera*. The grape-grower, therefore, has a difficulty in avoiding both infestations. The present indications are that the Nematode may present as serious a problem as *Phylloxera*. It is

hoped to hold a scientific investigation to determine the susceptibility of different varieties of grapes to Nematode infestation.

The latest legislation and quarantine measures passed in the interest of the California grape industry are quoted.

SWINGLE (D. B.). **Pear and Apple Blight in Montana.**—*Montana Agric. Expt. Sta., Bozeman*, Circ. 98, August 1921, 10 pp., 3 figs. [Received 12th April 1922.]

As the punctures of insects, and particularly of Aphids, are one of the chief agencies by which pear and apple blight are introduced into trees, it is suggested that thorough spraying with tobacco extract would greatly reduce the spread of the disease during the summer. The winged adults are considered to be the most important carriers after the bees stop working in the flowers.

Spraying Programs for the Orchard and Fruit Garden, with Directions as to Sprays to be used.—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster*, vii, no. 1–2, January–February 1922, pp. 19–38.

This spraying programme gives directions for the preparation of the commonly used insecticides, with calendars for the treatment of all the principal fruits.

GOSSARD (H. A.). **Gas Treatment for Peach Borer.**—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster*, vii, no. 1–2, January–February 1922, pp. 39–40.

The value of paradichlorobenzene against the peach tree borer [*Aegeria exitiosa*, Say] [*R. A.E.*, A, viii, 189 ; ix, 325] is considered to have been proved, though some details are still in the experimental stage. Directions are given, however, for the application of this remedy.

GOODWIN (W. H.). **Heat for Control of Cereal Insects.**—*Ohio Agric. Expt. Sta., Wooster*, Bull. 354, January 1922, 18 pp.

The usual method of destroying insects in stored grains and mill products by means of heat is described, being based on the heating plants installed in more than 30 mills in the States of Ohio and Pennsylvania. It is considered that heat can be successfully used for the destruction of susceptible insects on hardy plants, to kill weevils in nuts, and for pests infesting dried fruits, beans, peas, etc. The germination of most seeds is not interfered with by heating them sufficiently to destroy the insects in them. Four formulae are given for calculating the amount of radiation surface required for a steam heating plant designed for killing insects. The greatest success will be obtained by carrying out the process on a warm, dry day in summer.

CROSBY (C. R.) & LEONARD (M. D.). **Insects that hunt the Rose.**—*Amer. Rose Annual, Amer. Rose Soc., Harrisburg, Pa.*, 1922, pp. 89–100, 8 figs. [Received 12th April 1922.]

A short account is given of the chief insect pests of roses in America, with useful notes on suitable remedies for each. Among those dealt with are the sawflies, *Endelomyia rosae*, Harr. (American rose slug), *Cladius pectinicornis*, Fourc. (bristly rose slug) and *Emphytus cinctus*, L. (coiled rose slug), for which the remedies are a strong jet of water or the

application of 2 lb. lead arsenate in 50 U.S. gals. of water, or Bordeaux mixture, hellebore, either as a spray or dust, and Black-leaf 40. The Curculionid, *Rhynchites bicolor*, F., is generally controlled by hand-picking, or lead arsenate sprays. As this weevil breeds largely in wild roses, these should be destroyed in the vicinity of the garden. The moth, *Euclea indetermina*, Boisd., is chiefly injurious in the southern States; the caterpillars, which feed on the lower surface of the leaves, are usually picked off by hand (the picker wearing a glove), or they may be sprayed with lead arsenate.

LOCHHEAD (W.). **Inter-relations in Nature.**—*Scientific Agric., Gardenvale, Quebec,* i, no. 1, January 1921, pp. 19–23, 6 figs. [Received 12th April 1922.]

This paper points out and discusses briefly those inter-relations in nature that have to do more particularly with insect life, including those between insects and insects, insects and other animals, insects and plants, including bacteria and fungi, and insects and inorganic nature. Well-known examples of these are cited, such as parasitism of the gipsy moth by other insects, the control of the citrus mealy-bug [*Pseudococcus* spp.] by the Coccinellid, *Cryptolaemus montrouzieri*, and the rôle of insects as disease carriers to both man and plants. The responses of insects to various stimuli, such as light, gravitation, heat, electricity, moisture, pressure, and chemical substances, have only been studied comparatively recently, and afford a field full of possibilities for the economic entomologist. In the future, when knowledge of tropisms and their responses has increased, many modifications of present remedial measures may be introduced.

GIBSON (A.). **Grasshopper Situation in the Prairie Provinces.**—*Scientific Agric., Gardenvale, Quebec,* i, no. 1, January 1921, pp. 23–24. [Received 12th April 1922.]

The early campaigns against grasshoppers in Canada and the United States are briefly reviewed. In Canada there was every prospect of a serious outbreak in 1920 in the Prairie Provinces, but the definite plan of organisation arranged by the Provinces of Manitoba and Saskatchewan, and the close co-operation of federal and provincial officials, produced excellent results, and it is estimated that about £3,400,000 was saved by the farmers by following their recommendations. Enormous quantities of poison bait were used. Experiments with chlorine gas indicated that the insects could be destroyed by this method, but that it was too expensive for practical purposes.

LOCHHEAD (W.). **The Story of Spraying Mixtures.**—*Scientific Agric., Gardenvale, Quebec,* i, no. 3, March 1921, pp. 113–115. [Received 12th April 1922.]

The outstanding events in the history of spraying mixtures are briefly reviewed, from the year 1860 to the present time, and a short account is given of the chief insecticides, fungicides and dusts used for poisoning.

PETCH (C. E.). **Spraying vs. Dusting.**—*Scientific Agric., Gardenvale, Quebec,* i, no. 4, April 1921, pp. 171–172. [Received 12th April 1922.]

Experimental work in New York, Michigan, Illinois, Nova Scotia and Quebec shows that dusting is as efficient as spraying in the control

of apple scab and biting insects. The two most important insecticides, calcium arsenate and lead arsenate, may safely be used with either system. Dusting is, however, inferior as a remedy for sucking insects, but improvements may be made in this respect during the next few years.

SEVERIN (H. H. P.). **The Life History of the Beet Leafhopper. A Record from Studies of** *Eutettix tenella* **conducted in the San Joaquin Valley, California.**—*Facts about Sugar, New York*, xiv, nos. 5–9, 4th, 11th, 18th, 25th February, & 4th March, 1922, pp. 92–93; 110–111; 130–131; 152–154, 158; & 170–171, 16 figs.

The life-history of *Eutettix tenella* (beet leaf-hopper) in California, which is here recorded in detail, has previously been noticed from another source [*R.A.E.*, A, x, 135].

SCHINDLER (A.). **Organisation de la Lutte contre l'***Icerya purchasi* **au Maroc en 1921.**—*Rev. Agric. Afr. Nord, Algiers*, xx, no. 140, 7th April 1922, p. 226.

Icerya purchasi was probably introduced into Morocco from Europe in 1920; in July 1921 this Coccid developed to an alarming extent in Rabat, and the Phytopathological Service telegraphed to the Insectarium at Mentone for supplies of the Coccinellid, *Novius cardinalis*, which were delivered six days later by air. These pupae were reared in the laboratory, and adults and larvae were distributed in the infested areas. Three months later, very few living individuals of *I. purchasi* were visible, but the plantations were covered with larvae of *N. cardinalis*. Fresh infestations were discovered at Casablanca, and it was necessary to send there for supplies of *I. purchasi* on which to nourish the colonies of *N. cardinalis*, which are still being maintained in case of fresh outbreaks of the Coccid occurring.

PIERRET (E.). **Excursion aux Oseraies de la Maison Mercier à Kopstal.** —*Bull. Mens. Soc. Nat. Luxembourgeois, Luxembourg*, N.S., 15th Year, no. 31, 1921, pp. 107–114, 4 figs.

In the course of this paper on the cultivation of willows and osiers for industrial purposes, a chapter is devoted to the insect pests, which include the Cerambycids, *Aromia moschata*, L., *Lamia textor*, L., *Gracilia minuta*, F., and *Oberea oculata*, L.; the Chrysomelids *Phyllodecta* (*Phratora*) *vitellinae*, L., *P. vulgatissima*, L., *Melasoma populi*, L., and *M. tremulae*, F.; and the moths, *Aegeria* (*Sesia*) *formiciformis*, Esp., *Stilpnotia* (*Leucoma*) *salicis*, L., *Phalera bucephala*, L., *Earias chlorana*, L., *Eriogaster lanestris*, L., and *Argyresthia pygmaeella*, Hb. The usual insecticides proved useless against these pests, but their numbers are successfully kept down by pheasants, which for this purpose proved better than fowls.

HOULBERT (C.). **Les Coléoptères d'Europe, France et Régions voisines. Anatomie générale ; Classification et Tableaux génériques illustrés. Vols. ii & iii.**—*Paris*, Librairie Octave Doin, 1922, 340 pp., 30 plates, 99 figs ; 297 pp., 30 plates, 30 figs. [Price Fr. 12 per volume.]

These two volumes, together with the one previously noticed [*R.A.E.*, A, ix, 326], complete the classification and description of the 79 families, comprising 1,836 genera. The work, limited as it is

to the systematic classification of genera only, is a fitting introduction to a further undertaking, which it is hoped may shortly be attempted, of dealing in a similar manner with the 10,000 odd species of Coleoptera that comprise this fauna.

With the object of making the determination of any of the insects as simple as possible, the volumes are supplied with many useful keys as well as excellent plates and text figures.

ABBEY (G.). **Cyaniding Vines when in Growth.**—*Gdnrs'. Chron., London*, lxxi, no. 1841, 8th April 1922, p. 170.

As the application of cyanide to vines in the dormant stage failed to exterminate mealy-bugs [*Pseudococcus*], an application of 2¼ oz. was tried when the buds had made more than a quarter of an inch of growth, some shoots being an inch long. Only a few of the shoots that were unusually advanced were damaged, and all the mealy-bugs were destroyed. About 2,000 other plants were in pots in the vinery, comprising some 35 varieties in all stages of growth and flower. Young tomatos in seedling pots with their second leaves were nearly all killed. The tips of the young growths of *Chrysanthemum* and *Pelargonium* were damaged, but the mature leaves and blossoms did not suffer. Better results may be obtained with cyanide applied just as the leaves begin to fall and the bunches are all gathered than when the vines are quite dormant.

SMEE (C.). **British Ladybird Beetles. Their Control of Aphids.**—*Fruit Grower, Fruiterer, Florist & Mkt. Gdnr., London*, liii, nos. 1376, 1377 & 1378, 13th, 20th & 27th April, 1922, pp. 675–676, 717–718, & 759–760, 5 figs.

The study of the life-histories and food habits of the Coccinellids here described has been undertaken to find out to what extent the controlling power of the beetles is limited by the discrepancies existing between their range of activity and that of their prey. The species dealt with are *Adalia bipunctata*, L., *Coccinella septempunctata*, L., *C. decempunctata*, L., var. *variabilis*, Ill., and *C. undecimpunctata*, L. A description is given of all stages of these beetles, with particulars of their distribution.

Pairing and oviposition continue alternately over an indefinite period, oviposition taking place every second day. The eggs are laid in batches and hatch in 5–9 days. The larvae remain on the egg-mass for at least twenty-four hours, sometimes two days. It is not certain what they feed on, but they will injure unhatched eggs, causing them to dry and shrivel up; they will attack large Aphids, but are only capable of controlling the small ones. The first moult occurs three to five days after hatching, the second three to seven days after the first, the third four or five days later. The time between the third and fourth moult is usually seven to nine days, of which only a portion is spent in active feeding. The adult emerges in 9–12 days, but towards the end of the year the pupal stage may be considerably lengthened. The total life-cycle is four to seven weeks. The earliest eggs are laid by the overwintering adults about the middle of April. Adults of this generation emerge a month later, and the second generation covers the period from the middle of May to the middle of June. The beetles arising from this generation produce offspring that become adults at the end of July, and these again give rise to a fourth brood from which adults emerge in October.

The four Coccinellids were fed on the following species: *Macrosiphum rosae*, Réaum., *M. urticae*, Kalt., *M.* (*Siphonophora*) *rubi*, Kalt., *M.* (*S.*) *sonchi*, L., *Aphis pomi*, DeG., *A. sorbi*, Kalt., *A. urticaria*, Kalt., *Phorodon humuli*, Schr., *Hyalopterus pruni*, F., *Acyrthosiphon pisi*, Kalt., *Myzus persicae*, Sulz., *M. cerasi*, F., *Cavariella capreae*, F., *Aphis sambuci*, L., and *A. rumicis*, L., when present on dock only. *C. decempunctata* and *C. undecimpunctata* were not fed on the last four named. *A. rumicis* was less palatable than any of the other species. The number of Aphids eaten by larvae and adults in captivity varied each day. The average number devoured daily by different individuals is given. The only other insects on which the Coccinellids were seen to feed in captivity were small nymphs of froghoppers (Cercopids), but it is improbable that this occurs in the field.

Hibernation takes place in the adult stage, normally beginning in the middle of October and ending in April. Both sexes hibernate, though this has not been definitely proved to be the case with *C. decempunctata*. *C. undecimpunctata* is commonly found in cracks in post and rail fences, etc. *C. septempunctata* occurs in or under vegetation. *A. bipunctata* has been found under loose bark of elm trees outside an orchard, and is also thought to hibernate in houses.

A description is given of an unsuccessful attempt to collect the beetles into one place, where they could be safely stored over the winter and placed out in early spring among the first crops likely to be attacked by Aphids.

Faes (H.) & Staehelin (M.). **Les Traitements contre la Cochylis (Ver de la Vigne) en 1921.**—*Ann. Agric. Suisse, Berne*, xxiii, no. 1, 1922, pp. 17–25.

A number of experiments in the treatment of the vine moth [*Clysia ambiguella*], carried out in 1921, are described in detail and the results recorded in tables. Owing to the extraordinary dryness of that year, the majority of the eggs of the second generation failed to hatch. The tests described confirm the efficacy of pyrethrum-soap and nicotine-copper sprays against the pest. The difficulty of determining the appropriate moment for nicotine treatment makes the pyrethrum-soap spray preferable against the larvae of the first generation; nicotine, on the other hand, is indicated for the destruction of the eggs laid by the second generation. The pyrethrum produced in the Vaudois and Valais regions has proved to be remarkably good.

Dry (F. W.). **Annual Report of the Division of Entomology, Kabete, for the Year ending 31st March 1920.**—*Kenya Dept. Agric. Ann. Rept., 1919-20, Nairobi*, 1921, pp. 71–77. [Received 13th April 1922.]

During 1920 *Antestia lineaticollis*, Stål (coffee bug) and *Diarthrothrips coffeae*, Williams (coffee thrips) were recorded for the first time from the Athi River and Donyo Sabuk district, but they did not occur in serious numbers. Parasitised eggs were found. Numerous outbreaks of caterpillars on flax occurred during the year, *Phytometra* (*Plusia*) *orichalcea*, F., being the best known species.

McLaine (L. S.). **The European Corn Borer in Southern Ontario.**—*Agric. Gaz. Canada, Ottawa*, ix, no. 1, January–February 1922, pp. 22–24.

During the summer of 1921 scouting for the European corn borer [*Pyrausta nubilalis*, Hb.] was carried out in connection with the

Ontario Department of Agriculture, as a result of which a total of about 7,690 square miles was found to be infested. The spread has been more or less general from practically all points of the 1920 infestation, the most noticeable extension being in a northerly, north-easterly and easterly direction. So far the injury in Canada has been confined to maize. Details are given of the scouting work and the quarantine in force against this pest.

MAHEUX (G.). **Report of the Provincial Entomologist.**—*Rept. Minist. Agric.* [*1919–20*], *Quebec*, 1920, pp. 147–154. [Received 18th April 1922.]

During 1919 vegetable pests included *Pieris rapae* (cabbage worm), *Phorbia brassicae* and *Leptinotarsa decemlineata* (potato beetle). *Epitrix cucumeris* (potato flea-beetle) appeared in great numbers in potato fields, but the damage did not extend to tomatos, as was the case in 1918. The only important pest of cereals in 1920 was *Melanoplus atlantis*. In 1919 there were fewer fruit pests. *Aphis pomi* caused considerable injury during the greater part of the summer. Unsprayed orchards were attacked by *Cydia* (*Carpocapsa*) *pomonella* (codling moth), and in 1920 by *Eucosma* (*Tmetocera*) *ocellana* (bud moth), which caused great damage. There were considerable numbers of *Schizura concinna* (red-humped caterpillar), which defoliated many apple trees, but only a few of *Hemerocampa leucostigma* (white-marked caterpillar) and *Datana ministra* (yellow-neck caterpillar). The Limacodid moth, *Phobetron pithecium*, which has been rarely seen for several years, locally caused considerable damage.

Pests of ornamental trees include *Cryptorrhynchus lapathi* (poplar and willow weevil), which is spreading rapidly, and *Agrilus anxius* (white birch borer), both of which are probably introduced on trees bought in neighbouring provinces.

SEN (P. C.). **The Large Brown Cricket,** *Brachytrypes portentosus*, **Lichet.**—*Bengal Agric. Jl., Dacca*, i, no. 4, December 1921, pp. 111–112, 1 plate. [Received 18th April 1922.]

Brachytrypes portentosus is sometimes very injurious to jute, chillies, cotton, etc., feeding at night on the young plants. Towards the end of the rainy season the female lays 40–50 eggs in a mass in the burrow; these hatch in September and the young make new burrows. Their presence is detected by accumulations of fresh loosened earth near the holes. They gradually become winged. The life-cycle occupies one year. Remedial measures include destroying the crickets after driving them from their burrows by making clean conical holes in the openings and pouring in a mixture of 1 pint kerosene to 80 of water. If possible the fields should be irrigated, as this drives the crickets out of their burrows, and they are then destroyed by birds and other enemies.

Departmental Activities: Entomology.—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 3, March 1922, pp. 206–210.

The cultivation of *Citrus* in parts of the Transvaal is seriously hampered by the presence of red scale [*Chrysomphalus aurantii*]. A co-operative society has eventually been formed for the purpose of fumigation over a large area; this, however, has been abandoned for the present on account of heavy storms that have greatly damaged

the fruit. An undetermined weevil has been defoliating sweet-potato plants, but the damage is not yet serious enough to jeopardise the crop. Large areas of the Union still prohibit the introduction of apples, pears and quinces, as a protection against the codling moth [*Cydia pomonella*], but such restrictions seem to be an inadequate protection, as the insect has appeared in fresh localities.

Cotton, on the whole, has been remarkably free from serious insect pests, and the numbers of bollworms were almost negligible in many localities. The Sudan bollworm, *Diparopsis castanea*, was the one most commonly seen. The Jassid, *Chlorita fascialis*, seems to be doing considerable damage to the plants by causing leaf-burn and eventual defoliation. Weakened plants are particularly susceptible to this injury. *Aphis gossypii* (cotton aphis), which is usually a minor pest, has been very troublesome, causing a crinkled appearance of the leaves, the weaker plants appearing stunted. This Aphid is frequently found on melons and other Cucurbitaceous plants. Minor cotton pests were a weevil, *Ellimenistes laesicollis*, and *Dysdercus* spp. and *Oxycarenus* sp. (cotton stainers).

The elegant grasshopper [*Zonocerus elegans*] was troublesome in Natal. A remedy that was found effective when the insects were ½–1 in. long was coal-tar on old sheets of iron, or anything rigid, laid out in the fields. When the insects are about 1½ in. long they scatter over the field, and can then be destroyed in numbers by means of a wire birch. The melon and pumpkin fly [*Dacus* sp.] has been controlled on cucumbers, pumpkins, marrows and melons by the application of Mally fruit-fly bait, prepared from 1 lb. Paris green, ½ lb. slaked lime and 25 lb. crude sugar to 50 gals. of water. *Apate* spp. were, as usual, injurious to ornamental trees by boring into the softer wood and then upwards for a long distance, rendering the infested stems valueless. The object of this attack is not known, as the beetles go elsewhere to oviposit. Grape-vines, *Bougainvillea*, apples, oranges, pomegranates and silky oaks have all been attacked. Imported timber was found to be infested with *Lyctus brunneus* (powder post beetle), which frequently attacks *Eucalyptus* and *Acacia* poles used as rafters, and also bamboo, which is therefore seldom used without a dressing of coal-tar, applied as soon as possible after cutting and splitting. Wattles and poles are frequently soaked for some days in an arsenical solution, such as a cattle-dip, to make them immune from attack, while soaking in water is thought to dissolve the materials that attract the beetles. Another beetle imported in timber was identified as *Schistoceros hamatus*, F.

Locust Destruction.—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 3, March 1922, pp. 233–235.

The organisation of anti-locust campaigns in South Africa is described. Over 66,000 swarms were destroyed during the season. Studies of the life-history of the insect [*Locustana pardalina*, Wlk.] have shown that the female deposits not one cluster of eggs only, as has been supposed, but as many as four. The present season has confirmed the theory that outbreaks of locusts follow a severe drought. The abnormal infestation is probably due to the fact that in addition to eggs laid by the swarms that escaped destruction in 1920–21, the eggs that were deposited in the previous season, and did not get sufficient rain to enable them to hatch, have hatched during the very favourable climatic conditions of the present season. It is impossible, owing

to the peculiar nature and sparse population of some parts of the country, to prevent every swarm from reaching the flying stage, and only by co-operation can successful measures be taken against the winged insect, the Government being willing to assist by supplying poison, pumps, etc. The use of aeroplanes, which has been suggested against winged locusts, is considered impracticable.

Swaziland Cotton Growing Proclamation, 1921.—*Capetown*, no. 63, 9th September 1921. [Received 27th April 1922.]

Under the above proclamation, dated 9th September 1921, the High Commissioner is empowered to make, alter and repeal regulations, and to provide penalties, connected with the importation of cotton plants or seeds; for the requisitioning or compulsory purchase by the Swaziland Administration of cotton seed in Swaziland suitable for sowing purposes; for the destruction of all cotton plants or portions thereof after the season's crop has been picked; for dealing with diseases affecting cotton; and for the regulation of the planting, cultivation and harvesting of cotton.

High Commissioner's Notice, No. 66 of 1921.—*Capetown*, 12th September 1921. [Received 27th April 1922.]

Under the Swaziland Cotton Growing Proclamation, 1921, the following regulations came into force from the 12th September 1921. No cotton plants or portions thereof may be imported into Swaziland from any place without permission in writing from the Resident Commissioner. All cotton plants or portions thereof that are above the surface of the soil shall be destroyed by the owner by burning after the first season's crop has been picked, and they shall not be allowed to remain after the 15th August in each year without permission in writing from the Resident Commissioner for an extension of time, and then only for the period of such extension. All roots shall be lifted by digging to a depth to prevent their re-growth, or by ploughing the land not later than the 31st August of each year, except with the permission as above mentioned. No person shall grow cotton from seed not up to a given standard of quality. The Resident Commissioner may at any time prior to the 15th June of each year, or thirty days after the submission of a sample, requisition for distribution any cotton seed suitable for sowing purposes, and not required for the grower's own planting. Growers must submit samples of seed for sowing purposes to the Resident Commissioner before disposal. Regulations in respect of penalities are also given.

Navel (H. C.). **Les Principaux Ennemis du Cacaoyer aux Iles de San-Thomé et de Principe.**—*Paris*, Emile Larose, 1921, 135 pp., 3 figs., 28 plates, 4 coloured plates, 2 maps. [Received 8th May 1922.]

This is the report of a mission to San Thomé and Principe in 1919, organised by the Sociedade d'Emigração para S. Thomé e Principe in view of the increased losses due to pests and diseases of cacao. During a visit of over six months nearly every one of the estates was carefully inspected. The importance of each enemy is discussed, special attention being paid to insects, of which the following were observed: *Heliothrips rubrocinctus*, Giard; *Helopeltis* sp. (*sanguineus*,

Popp. ?) ; the Chrysomelid beetles, *Nisotra theobromae*, Lab., and *Lymidus variicolor*, Berl. ; the Coleopterous borers, *Mallodon downesi*, Hope, and *Apate monacha*, L. ; and termites.

The most severe borer injury was due to a Lepidopterous larva generally believed to be *Zeuzera coffeae*, Nietn. Though the larvae of this moth may attack the trunks, in the author's breeding experiments a female of the Megalopygid, *Eulophonotus myrmeleon*, Feld., was obtained. Infested branches must be burned, or the galleries may be closed with a plug soaked in carbon bisulphide. Only one adult was bred, the larvae being parasitised by a fly thought to be a Tachinid, which is probably the factor that keeps down this pest.

The insect pests of cacao in Africa that were not found in San Thomé are reviewed.

After reference to cultural and other work in connection with the plantations, the pests of plants other than cacao are noticed, *Oryctes latecavatus*, Fairm., being the chief enemy of coconut.

The final section deals with the preparation of insecticides and fungicides.

MAHEUX (G.). **Les Insectes dans nos Serres.**—*Scientific Agric., Gardenvale, Quebec*, ii, no. 8, April 1922, pp. 265–267.

A brief account is given of the more important pests of greenhouses, including *Tortrix* (*Archips*) *rosaceana*, *Pseudococcus* spp., *Coccus hesperidum*, *Hemichionaspis aspidistrae*, *Macrosiphum sanborni* and *Tarsonemus pallidus*. Regular fumigation is advocated as a means of preventing the establishment of any of these pests.

WILLIAMS (R. O.). **Cacao Cultivation in Grenada.**—*Bull. Dept. Agric. Trinidad & Tobago, Port-of-Spain*, xix, pt. 4, 1922, pp. 215–223.

The most widely distributed and most virulent pest of cacao in Grenada is the thrips [*Heliothrips rubrocinctus*, Giard], for which the remedies are improved cultivation and nicotine sulphate sprays [*R.A.E.*, A, vi, 496; vii, 530]. Mealy-bugs [*Pseudococcus* spp.] are frequently troublesome, especially in combination with the black ant [*Cremastogaster brevispinosa* var. *minutior*]. Crude oil emulsion has proved the best remedy, but must be applied when the trees are not in flower, as the strength used (1 gal. to 1 lb. soap in 10 gals. of water) injured those blooms that came into contact with it. A large termite, *Calotermes balloui*, enters trees through old wounds and causes great destruction. All wounds caused by pruning, etc., should be treated at once with an antiseptic, crude oil having proved the best for the purpose.

Plant Diseases and Pests.—*Bull. Dept. Agric. Trinidad & Tobago, Port-of-Spain*, xix, pt. 4, 1922, pp. 169–187, 11 figs.

The text of the Plant Protection Ordinance, no. 29 of 1919, for the prevention and eradication of diseases and pests affecting vegetation, is given verbatim. This repeals the previous ordinances, and under its terms Proclamation no. 56 of 1921 is issued declaring certain pests and diseases to be regarded as coming within the meaning of the ordinance. The pests enumerated are *Brassolis sophorae* (coconut butterfly), the parasol ant, the cacao beetle, locusts, *Rhynchophorus palmarum* (gru-gru beetle) and *Strategus aloeus* (rhinoceros beetle).

Notes (by W. Nowell and F. W. Urich) on the pests and diseases enumerated are appended; the parasol ants referred to are *Atta cephalotes* and *A. octospinosa*, the cacao beetle, *Stirastoma depressum*; while the locusts include several species, of which the most injurious is *Schistocerca paranensis* (South American migratory locust).

As a precaution against the introduction of the pink bollworm [*Platyedra gossypiella*], the importation into the Colony of cotton seed, seed cotton and ginned cotton is prohibited, except under a permit issued by the Director of Agriculture.

HALL (G. C.). **A Carbon-tetrachloride Killing Bottle.**—*Ent. News. Philadelphia, Pa.*, xxxiii, no. 4, April 1922, pp. 112–113.

Carbon-tetrachloride is a very useful killing agent for insects, the method adopted being to place a piece of felt at least a quarter of an inch thick at the bottom of the bottle and cover this with cotton-wool to a depth of about one inch. The carbon-tetrachloride should be poured down the side of the bottle to avoid wetting the cotton, in sufficient quantity to saturate the felt. The bottle thus prepared will last a day in active service, and when corked will keep for months.

PARROTT (P. J.). **Control of Sucking Insects by Dusting.**—*Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 35–49, 4 tables.

All published results on the control of the San José scale [*Aspidiotus perniciosus*] by dusting are inconclusive. This insect is more resistant than any other species to insecticides in powder form. Dusting preparations composed of sodium, calcium and barium sulphides were less effective than the standard lime-sulphur spray solution; they also caused severe scorching of unfolding leaves. The deficiency of dusting materials is probably due to the poor insecticidal properties of the various powdered sulphides.

In experiments undertaken against pear psylla (*Psylla pyricola*) the adults showed a marked susceptibility to nicotine in dust and liquid forms. Dilutions of nicotine, considerably greater than the minimum necessary to control most sucking insects, were as toxic as the standard concentrations. The practicability of freeing an entire orchard remains to be demonstrated. The insects show a greater resistance to nicotine during periods of low temperatures.

The effect of nicotine in dust and liquid form on apple red bugs [*Lygidea mendax*], *Myzus ribis* (currant aphis) and *Brevicoryne* (*Aphis*) *brassicae* (cabbage aphis), together with the conclusions drawn from the dusting experiments here described, have already been noticed [*R.A.E.*, A, x, 305].

HARTZELL (F. Z.). **Pear Psylla Problems.**—*Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 50–55.

Tabulated results are given of spraying experiments made in July 1921, which, so far as the author knows, are the first proof that psylla adults [*Psylla pyricola*] are susceptible to nicotine dusts. Further investigations showed that the application had destroyed the older nymphs and adults, but had not killed the younger nymphs enveloped in honey-dew. Other tests proved that lime-nicotine and sulphur-

nicotine dusts controlled the Psyllid with equally good results, when the application was comparable, but that the lime dust covered better.

Spraying with 2½ U.S. gals. lime-sulphur, 50 lb. hydrated lime, 1 U.S. pt. nicotine sulphate and 100 U.S. gals. water at a pressure of 300 lb., an average of 5·3 U.S. gals. being used per tree, gave a killing efficiency of 98·7 per cent., which is practically what was reported in the previous year [*R.A.E.*, A, x, 211]. These experiments were made to prove the number of applications necessary each year to control *P. pyricola*. The conclusions arrived at are that a heavy lime-nicotine spray, when thoroughly applied at the proper time, will kill 98 per cent. or more of the first brood. If the orchard is not isolated serious reinfestation will occur. It is believed that a single application in an isolated orchard will protect it for the entire season, if made as soon as the eggs have hatched and before any adults have emerged. An instance is given of an attempt at dusting for nymphs, but it was not sufficiently successful to be recommended to growers.

STRICKLAND (L. F.). **Co-operative Experiments with Lime-nicotine Dust against Hard Shell Nymphs and Adults.**—*Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 55–65, 5 tables.

Experiments are described on the killing power of lime-nicotine dust on hard shell nymphs and adults of the third generation of the pear psylla [*Psylla pyricola*], and the results are tabulated. The value of drifting dusts is discussed, and redusting operations described. Data on the study of the migrations of the first and second brood adults show that the migration of the second brood is relatively limited. Investigations also indicate that the quince is preferred as a food-plant to plum, apple and peach. In any operation in the control of this Psyllid the condition of the trees shows whether the application has been successful. If even a very small area of green surface escapes treatment, hundreds of nymphs and adults will remain untouched. The trees should be moderately low-headed and the branches properly spaced. A heavy lime-nicotine spray should be directed against the first and second brood nymphs, or an application of lime-nicotine dust should be made for the hard shell nymphs and adults of the first or second generation.

STRICKLAND (L. F.). **Control of Codling Moth in Western New York.** *Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 65–73, 3 tables.

For several years it has been felt that the usual strength of 2½ lb. lead arsenate to each 50 U.S. gals. of spray is not sufficient to kill the young larvae of the codling moth [*Cydia pomonella*] when they are emerging from the eggs and before they get through the skin to enter the apple. Experiments are described of spraying orchards in the calyx period and again when oviposition was known to be definitely started. The calyx application was made as soon as all the petals had dropped with the usual formula, but the second application contained 5 lb. of lead arsenate (instead of 2½) to each 50 U.S. gals. of material. There was a very marked reduction in the total number of apples injured, but as there was only a slight infestation in 1920, partly owing to a parasite, *Trichogramma minutum*, and to the season, further data are necessary.

The experiments in 1921 show that the larvae that cause the deep work in the apples and that live over the winter may be killed by the use of 5 lb. lead arsenate to each 50 U.S. gals. spray, applied at the time oviposition is about to begin.

The proper time for the application of the second spray will vary each year. In Niagara the moth usually begins to oviposit about the middle of June, but is of little consequence till the evening temperatures are 60° or above for a series of days. This occurs about the first of July on the Ontario Plain, and in central New York and the Hudson Valley about the middle of June, just when the moths are emerging. The proper way to gauge the work is by means of the information secured through oviposition records.

Quaintance (A. L.). **Para-dichlorobenzene for the Control of the Peach Tree Borer.**—*Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 118–124.

The bulk of the information contained in this paper has already been noticed [*R.A.E.*, A, ix, 325; x, 186].

Spray Schedules.—*Proc. 67th [4th] Ann. Meeting N.Y. State Hortic. Soc., Rochester, N.Y.*, 1922, pp. 328–332.

Spray schedules for New York State for apple, peach, pear, cherry and plum are given.

Lyle (C.). **The Mexican Bean Beetle. A Serious Pest threatening Mississippi.**—*Qtrly. Bull. State Plant Bd. Mississippi, Agric. Coll., Miss.*, i, no. 1, April 1921, pp. 13–19, 2 plates, 1 fig. [Received 20th April 1922.]

Most of the information here given concerning the Mexican bean beetle [*Epilachna corrupta*, Muls.] has already been noticed [*R.A.E.*, A, ix, 374].

The danger of the introduction of this pest into Mississippi and the need for continued vigilance and the adoption of measures to prevent its spread are emphasised.

Rules and Regulations of the State Plant Board of Mississippi in effect August 1, 1921.—*Qtrly. Bull. State Plant Bd. Mississippi. Agric. Coll., Miss.*, i, no. 2, July 1921, pp. 17–51. [Received 20th April 1922.]

The regulations authorised by the Mississippi Legislature under the Plant Act of 1918 and amended in 1920 are quoted.

Arnold (G. F.). **The Japanese Camphor Scale in Mississippi.**—*Qtrly. Bull. State Plant Bd. Mississippi, Agric. Coll., Miss.*, i, no. 3, October 1921, pp. 1–3, 2 figs. [Received 20th April 1922.]

Pseudaonidia duplex is recorded from three different properties in Mississippi. As soon as the scale is found, all plants on the infested property are carefully inspected, and the owner's consent obtained to burn all those found to be infested. This scale has been found on more than a hundred different food-plants in the United States. The public are being warned through the press of the danger of introducing this and other pests by bringing uninspected plants into their homes, and other preventive measures are being adopted.

BENJAMIN (F. H.). **Sugar Cane Moth Borer in Mississippi.**—*Qtrly. Bull. State Plant Bd. Mississippi, Agric. Coll., Miss.*, i, no. 4, January 1922, pp. 4–6, 1 fig. [Received 20th April 1922.]

The life-cycle of *Diatraea saccharalis crambidoides*, Grt. (sugar-cane moth borer) and the damage done by it are described. It was found on three different farms in Mississippi during 1921. This is apparently the first authentic record of this moth infesting sugar-cane in Mississippi—except for an isolated infestation in the south-western corner of the State. As these infestations were only discovered late in the season, remedial measures will have to be postponed until next autumn.

Report of the Quarantine Department from October 1, 1921, to December 31, 1921.—*Qtrly. Bull. State Plant Bd. Mississippi, Agric. Coll., Miss.*, i, no. 4, January 1922, pp. 17–24, 4 figs. [Received 20th April 1922.]

A number of insects of economic importance have been found on plants and plant products arriving by boat on the Gulf Coast, including a Lepidopterous larva on lemon from the Canary Islands and several species of scales found on fruits and ornamental plants.

The insects intercepted during 1921 in shipments by all means of transportation, except parcel post, include: From Greece, *Aonidia lauri*, Bch., on bay leaves; from the Canary Islands, *Ephestia* sp. and scale on lemon; from Porto Rico, purple scale [*Lepidosaphes beckii*, Newm.] on orange; from Cuba, sweet potato weevil [*Cylas formicarius*, F.] and a new species of mite on sweet potatoes.

EGGERS (H.). **Seltene und neue paläarktische Borkenkäfer. III.** [Rare and New Palaearctic Bark-beetles.]—*Ent. Blätter, Berlin*, xviii, no. 1, 31st March 1922, pp. 12–18.

Scolytus (*Eccoptogaster*) *confusus*, sp. n., is described from Vladivostock in *Ulmus montana* var. *laciniata*; *S.* (*E.*) *mandli*, sp. n., and *S.* (*E.*) *sibiricus*, sp. n., from Transbaikalia; and *Hylesinus mandshuricus*, sp. n., from Manchuria in ash.

Crypturgus maulei, Roubal, from Silesia, in silver fir, is recorded from Germany for the first time. The author is now of opinion that he has been in error in treating *Polygraphus seriatus*, Reitt., as a synonym of *P. punctifrons*, Thoms., and *Pityogenes irkutensis*, Egg., as a synonym of *P. monacensis*, Fuchs. In the case of *Xyleborus xylographus*, Say, the old specific name *saxeseni*, Ratz., should be restored in view of Swaine's remarks in "Canadian Bark-beetles, Part II," p. 127 [*R.A.E.*, A, vii, 67] that *X. xylographus*, Say, is not identical with *X. saxeseni*, also occurring in North America, but is closely allied to *X. inermis*, Eichh.

FAHRINGER (J.). **Beiträge zur Kenntnis der Lebensweise einiger Chalcididen.** [Contributions to the Knowledge of the Habits of some Chalcids.]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvii, no. 3–4, 15th March 1922, pp. 41–47.

This is the concluding portion of a paper on Chalcids, chiefly parasites of Cynipids, issued as a result of breeding experiments [*R.A.E.*, A, x, 203].

NÜSSLIN (O.) & RHUMBLER (L.). **Forstinsektenkunde.** [Forest Entomology.]—*Berlin*, Paul Parey, 1922, 3rd edn., xvi+568 pp., 457 figs., 8 portraits. Price 120 Marks: 14*s*. 8*d*.

This third edition of Nüsslin's "Textbook of Forest Entomology," prepared by Dr. Rhumbler, contains an amount of new matter, including a section on insect morphology intended to assist the forester in identification work. More attention is paid to the larvae of forest pests, and biological control methods are discussed. *Cryptococcus fagi* and other pests that have increased in Germany are dealt with more fully than before. In spite of these and other additions, the adoption of the editor's system of symbols for representing the life-histories of insects and a new arrangement of the foot-notes have been successful in producing a volume that is only a trifle larger than the earlier editions, the valuable, practical features of which have been carefully retained.

DASH (J. S.). **Troisième Rapport de la Station Agronomique de la Guadeloupe, juillet 1920 à juin 1921.**—*Sta. Agron. Guadeloupe, Pointe-à-Pitre*, 1922, pp. 7–17. [Received 20th April 1922.]

No new pests or diseases were observed during the year under review. The most important insect attacking sugar-cane is the moth-borer, *Diatraea saccharalis*, F., and very little is done to reduce its numbers. More attention should be given to the collection of eggs and to the destruction of all infested slips before the canes are mature. The larvae of *Diaprepes* spp. and the Melolonthid, *Cyclocephala tridentata*, F., which attack the roots, are also increasing to an alarming extent, and every effort should be made to keep them in check.

Cotton was inspected in one locality, and was found to harbour only a few individuals of *Eriophyes gossypii* (leaf blister mite). On coconut palms the worst pest was the whitefly, *Aleurodicus* (*Aleurodes*) *cocois*, Curt.

FEYTAUD (J.). **Les Formes de Développement de la Cochylis et de l'Eudémis.**—*Rev. Zool. Agric. et App., Bordeaux*, xxi, no. 2, February 1922, pp. 21–25, 3 figs.

The characters distinguishing the two vine-moths [*Clysia ambiguella* and *Polychrosis botrana*] in their various stages are described.

NIKOLSKY (V. V.). **Причины передвиженія Личинок Азиатской Саранчи.** [Reasons for the Migration of the Larvae of the Asiatic Locust.]—**Турк. Сельское Хоз.** [Separate from *Turkestan Agric.*], *Tashkent*, 1918, nos. 3 & 4, March & June 1918, 12 pp. [Received 22nd April 1922.]

The migration of young hoppers of the Asiatic locust [*Locusta migratoria*, L.] is generally considered to be a march in search of food, and the opinions of various writers on this subject are quoted. It has also been noticed, however, that with certain locusts migration is more or less systematic. From the author's observations it would seem that instincts other than the want of food may influence these migrations. The movement that does not stand in relation to the food supply may occur during the first instar, whereas the majority of authors record the migrations from the second instar. Many of the

actions in the life of the hoppers are found to be in close relation to the temperature, the influence of a given temperature varying, however, in the different instars. Hoppers of the first instar succumb if forced to move about on the bare earth the temperature of which has reached 53° C. [127° F.], but the movement of the fifth stage hoppers is not stopped until a temperature of 57 or 58° C. [134–136° F.] is reached.

Hoppers that are just about to moult, or that have just moulted, succumb to lower temperatures. At the moulting period the hoppers are greatly weakened. It is at this period that cannibalism often occurs. Moulting may also be hindered if the hoppers about to moult are surrounded by those of other stages. The author thus thinks that it is an instinct for self-preservation that induces the hoppers to migrate.

WEBSTER (J. F.). **Spraying of Trees for greater Crop Production.**—*Dept. Agric., 'Iraq, Baghdad,* Leaflet no. 8, 1922, 4 pp. [Received 21st April 1922.]

Instructions are given for spraying date palms against diseases and an Aphid infesting peach trees.

RAMACHANDRA RAO (Y.). **A Preliminary List of Insect Pests of 'Iraq.**—*Dept. Agric., 'Iraq, Baghdad,* Memoir no. 7, 1921, 35 pp., 5 figs. [Received 24th April 1922.]

This paper is an amplification of one previously noticed [*R.A.E.*, A, x, 160], and gives notes on the life-history and habits of most of the pests observed by the author during his year's work in Mesopotamia. Among the more important species dealt with are an Anthomyiid, presumably *Hylemyia coarctata*, Fall., the larva of which causes dead-hearts in wheat and barley, and a wheat pest identified by Dr. Felt as *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly). Ripe stems of wheat broken off an inch above ground were found to be cut from inside by the sawfly, *Cephus pygmaeus*, L., which tunnels down through successive joints to the base of the stem, where it shelters during the heat of summer and the cold of winter, emerging as an adult in the spring. The most injurious pest of wheat is the bug, *Eurygaster integriceps*, Put., the young of which attack the grains in the milky stage and cause much damage. The bugs become adult in May and June, and disappear when the wheat is harvested. A smaller bug, *Aelia acuminata*, L., has similar habits. The large brown grasshopper, *Tettigonia albifrons*, F., attacks maturing ears of wheat and barley, maize cobs, pea pods, young cotton shoots, various vegetables, and leaves of figs, mulberry and apricot, and is capable of doing much damage. Eggs are laid in May and June, and the adults disappear about July. *Dociostaurus maroccanus*, Thunb. (Moroccan locust) also occurs.

Myiopardalis pardalina, Big., is practically the only fruit-fly found in Mesopotamia. Apricots, peaches and nectarines are all damaged by the fruit-boring moth, *Anarsia lineatella*, Z., while *Cydia pomonella*, L., is the chief pest of apples. Figs are attacked by *Lonchaea aristella*, Beck. (black fig fly), which may cause the loss of 50 per cent. of the crop [*cf. R.A.E.*, A, vi, 75].

A large Bostrychid, *Phonapate frontalis*, F., var. *uncinata*, Karsch, was found boring in date-palm stems used as rafters in a house; termites and leather beetles are also sometimes troublesome household pests.

The only bollworm observed was *Earias insulana*, Boisd., which is parasitised by *Habrobracon kitcheneri*, Dudg. & Gough. The latter is

undoubtedly also a parasite of *Batrachedra amydraula*, Meyr.—the caterpillar causing the "hashaf" condition in dates. A number of minor cotton pests also occur, including the stainer, *Oxycarenus hyalinipennis*, Costa, though *Dysdercus* is conspicuous by its absence.

La Lutte contre l'*Icerya purchasi* en Algérie.—*Rev. Agric. Afr. Nord, Algiers*, xx, no. 142, 21st April 1922, pp. 248–249.

The information contained in this paper is quoted from a report submitted by M. Bousbacher, president of the syndicate for the protection of citrus growers of Boufarik, to the Chamber of Agriculture of Algiers. Attention is called to the danger of the spread of *Icerya purchasi* in Algeria. A decree has been passed by the Chamber of Agriculture authorising the strict inspection of all suspected material at all the Algerian ports and frontiers of the Colony.

Importation of Sugar-cane into British India by Sea.—*Trop. Agric., Peradeniya*, lvii, no. 6, December 1921, p. 381. [Received 25th April 1922.]

Under the revised regulations the importation of sugar-cane into British India from the Fiji Islands, New Guinea, Australia and the Philippine Islands is entirely prohibited. From elsewhere it must be accompanied by a certificate of inspection pronouncing it to be free from cane-borers, scale-insects, *Aleurodes*, and various diseases. It must come from a crop that is free from mosaic disease, and Fiji disease of sugar-cane must not occur in the country of origin. In the case of plants intended for cultivation under the personal supervision of the Government sugar-cane expert, an official certificate is required that the country of export is free from Fiji disease.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.* [*Washington, D.C.*], ii, no. 1, 1st April 1922, 32 pp. [multigraph].

The chief feature of this number is the brief review of the principal pests occurring during the winter of 1921–22 and the spring of 1922. These include *Blissus leucopterus*, Say (chinch bug), which suffered very little during the comparatively mild winter. Investigations in Ohio indicate that this pest normally hibernates in woodlands, and not in the weeds and grass along the fence rows as was formerly supposed. *Mayetiola destructor*, Say (Hessian fly) has not been reported as serious in any important wheat-growing centre. *Toxoptera graminum*, Rond. (wheat aphis) has been practically absent from northern Texas, the severe droughts of the preceding summer having prevented the growth of self-sown wheat. There has, however, been an outbreak in northern Oklahoma and eastern Kansas; it appears, therefore, that these outbreaks are not necessarily the result of the northern migration of the Aphid from northern Texas. *Eleodes opaca*, Say (false wireworm) has become seriously abundant and destructive in western Kansas and Nebraska. The dry autumn and winter in many localities prevented germination of the seed until the spring, and consequently favoured the pest. The maize-borer discovered in Texas and northern New Mexico last summer has now been determined as *Diatraea lineolata*, Wlk. In part of Texas the infestation amounts to 50 per cent. of the crop. *Hylemyia cilicrura*, Rond. (seed corn maggot) has been reported from North Carolina, Alabama and Louisiana. *Lycophotia margaritosa*,

Haw. (variegated cutworm) was exceedingly abundant in Sinaloa, Mexico, where it is a serious pest of commercial tomato and pepper plantations. *Nezara viridula*, L. (southern green plant bug) has again been destructive in southern Alabama. *Anthonomus grandis*, Boh. (cotton boll-weevil) is expected to be numerous in Alabama, as about five times the normal number of weevils were alive after the winter. *Toxotrypana curvicauda*, Gerst. (papaya fruit-fly) was destructive in Florida, causing a loss of 40 per cent. of the crop in one district. *Diarthronomyia hypogaea*, Lw. (chrysanthemum gall midge) caused serious depredations in Maryland, New York and Massachusetts. *Tarsonemus pallidus*, Banks (cyclamen mite) was seriously injurious in greenhouses in Baltimore and Philadelphia, attacking cyclamen and snapdragon. *Typophorus* (*Paria*) *canellus*, F. (strawberry leaf-beetle) is causing considerable trouble among roses in greenhouses in Massachusetts and Pennsylvania.

A general detailed report of pests occurring chiefly during the month of March is given.

Britton (W. E.). **Twenty-first Report of the State Entomologist of Connecticut for 1921.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 115–188, 7 plates, 5 figs.

The pests intercepted on nursery stock include: *Calophasia lunula*, Hb., from France; a Cryptophagid beetle on Manetti rose from France; *Emphytus cinctus*, L., from Holland, France and England; *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) on apple seedlings from France; and Lepidopterous larvae from France. The inspection work for the year is described.

The Anthomyiid, *Hylemyia cilicrura*, Rond., caused serious injury to tobacco plants. Although this pest has a large number of food-plants, it has apparently not been recorded from tobacco before. Its increase appears to be favoured by ploughing in clover and lucerne, or even by a heavy application of manure. These conditions, combined with heavy rainfall and low temperature, appear to be most favourable for its development. The injury may be materially reduced by shallow covering of the seed in cold wet seasons.

Heliothis (*Chloridea*) *obsoleta*, F. (corn ear worm) was particularly abundant and widespread during 1921 in Connecticut. An account is given of its life-history and habits. As a rule, the damage done by this moth is so slight that remedial measures are unwarranted, and it is thought improbable that a similar outbreak will occur in the following season.

Asparagus beetles were unusually abundant during 1921. *Crioceris asparagi*, L., spreads chiefly by flight of the adults, but probably hibernating beetles or pupae are shipped in asparagus roots or other material and carried long distances. In the northern States there are supposed to be two generations a year; further south three or four may possibly occur. The adults appear in Connecticut in May, soon after the cutting season begins. Oviposition occurs on the tender shoots and young growth. The eggs hatch in a few days, and the larvae feed on the young foliage. When fully grown they enter the soil for pupation, and the adults emerge about a week later. On Long Island the complete life-cycle requires about 30 days, but this may be shortened or lengthened according to the climate. When abundant

the beetles often eat holes in the sprouts. The eggs of *C. duodecimpunctata*, L., are laid singly on the old and fruiting plants. The larvae are not important as destroyers of the foliage, as they feed chiefly on the berries. This beetle is particularly destructive where plants are grown for seed. In the early summer the adults feed on the tender shoots, and later on the leaves and bark of the stems. The life-history is very similar to that of *C. asparagi*, and there are probably the same number of generations a year. The natural enemies of these beetles include the Coccinellids, *Ceratomegilla fuscilabris*, Muls., and *Hippodamia convergens*, Guér., *Podisus maculiventris*, Say (spined soldier bug), *Stiretrus anchorago*, F. (bordered soldier bug), *Polistes pallipes*, Lep., *Ischnura posita*, Hagen, and *Tetrastichus asparagi*, Crawf.

If chickens or ducks are allowed the run of the asparagus bed from the beginning of the season, no other remedial measures will be required. In small garden areas hand-picking and dusting with air-slaked lime or pyrethrum is advocated. The larvae may also be knocked off with a strong spray from a garden hose. To prevent defoliation of the plants the adults may be destroyed after the cutting season by spraying with lead arsenate. A strong mixture should be used containing at least 6 lb. of paste to 50 U.S. gals. water. Dusts should be applied when the plants are wet from the dew or rain.

The scale-insects recorded are *Toumeyella liriodendri*, Gmel. (tulip tree scale), occurring throughout the State on tulip trees; *Pulvinaria vitis*, L. (cottony maple scale); *Chionaspis pinifoliae*, Fitch (pine leaf scale); *Eulecanium* (*Lecanium*) *nigrofasciatum*, Perg. (terrapin scale), occurring on maple, peach, plum, cherry, apple, quince, *Crataegus*, sycamore, Carolina poplar, olive, blueberry, spice bush and *Bumelia*; and *C. euonymi*, Comst., infesting *Euonymus*, orange, *Althaea* and bitter sweet (*Celastrus scandens*). Some information is given concerning the distribution of these scales in Connecticut, the injury caused by them, and the natural enemies recorded by various authors.

Hemerophila pariana, Clerck (apple and thorn skeletoniser) appears to be very much more widely distributed in Connecticut than was at first supposed. The Tachinid, *Exorista pyste*, Wlk., was reared from the pupa. Trees should be sprayed with lead arsenate, but the applications will probably have to be made late in the season so that the poison is not washed off before the late brood begins to feed.

Other insects recorded during the year are tent caterpillars, apple Aphids, *Cydia* (*Laspeyresia*) *molesta*, Busck (Oriental peach moth), *Aegeria* (*Synanthedon*) *exitiosa*, Say (peach borer), *Alsophila pometaria*, Harr. (fall canker worm), *Aspidiotus perniciosus*, Comst. (San José scale), *Eulia velutinana*, Wlk. (red-banded leaf-roller), *Enarmonia prunivora*, Walsh (lesser apple worm), *Paratetranychus pilosus*, Can. & Fanz. (European red mite), *Rhagoletis pomonella*, Walsh (apple maggot), *Lygidea mendax*, Reut. (false apple red bug), *Syntomaspis druparum*, Boh. (apple seed Chalcid), discovered for the first time in the State, gipsy moth (*Porthetria dispar*, L.), *Argyresthia thuiella*, Pack. (arbor-vitae leaf-miner), *Monarthropalpus buxi*, Lab. (box leaf-miner), *Lepidosaphes ulmi*, L. (oyster-shell scale), *Chermes abietis*, Kalt. (spruce gall Aphid)—which may be controlled in nurseries by clipping and burning the galls as soon as noticed, spraying in the autumn also being effective—wireworms, *Phorbia brassicae*, Bch. (cabbage maggot), *Brevicoryne brassicae*, L. (cabbage aphis), *Aphis pseudobrassicae*, Davis (turnip aphis), *Macrosiphum solanifolii*, Ashm. (potato aphis), and *Lachnosterna* (*Phyllophaga*) spp.

Ashworth (J. T.) & Britton (W. E.). **Report of Gipsy Moth Work. Season of 1920-1921.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 132–145, 1 fig., 1 plate.

The policy pursued in former years with regard to the suppression of gipsy moth [*Porthetria dispar*] [*R.A.E.*, A, ix, 292] has been continued with further success. Two new infestations were found, but many previously infested areas were free. Details of the work are given, arranged under the towns. No less than 1,598,775 individuals of the egg-parasite, *Schedius kuvanae*, How., were liberated in the north-eastern part of the State.

Watch is still being kept for the brown-tail moth [*Nygmia phaeorrhoea*], but as it is very scarce, remedial measures are at present unnecessary in Connecticut.

Garman (P.). **Notes on the European Red Mite,** *Paratetranychus pilosus*, **C. & F.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 146–152.

As a result of the experiments with various insecticides for the destruction of the eggs of *Paratetranychus pilosus*, it is evident that miscible oils are valuable ovicides, but if used in excessive quantities they may injure the apple trees, especially the trunk and larger limbs. In Connecticut, miscible oil should be applied as a dormant spray before the buds open in March or early April. If a delayed dormant spray of lime-sulphur is used, it should be applied as late as possible, as it kills the young mites after hatching [*cf. R.A.E.*, A, ix, 293].

Garman (P.). **The Violet Gall Midge,** *Phytophaga violicola* **(Coquillett).**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 152–156, 1 fig., 1 plate.

Contarinia (*Phytophaga*) *violicola* became so abundant during 1920 in certain greenhouses in Connecticut that continual hand-picking had to be adopted. The yearly loss from this midge has been estimated at about £200. Intermittent fumigation with hydrocyanic acid gas and dusting with lime have not proved successful. The eggs are laid in the curled portion of the leaves, and under laboratory conditions they hatch in from four to six days. Soon after the eggs hatch the leaves have a deformed appearance. The larvae remain in the curled portion until ready for pupation, for which purpose they enter the soil to a depth of about one millimetre. The pupal stage lasts about two weeks. The total life-cycle from egg to adult varied from 33 to 37 days. These records were taken during October and November 1920, the temperature being much lower than is usually maintained in commercial greenhouses during the summer; later observations indicate the possibility of a shorter life-cycle, probably about three weeks.

Applications of insect powder and dry lime to the soil failed to kill the larvae or pupae. Systematic fumigation with hydrocyanic acid gas appears to be the most satisfactory remedial measure at present, but it must be repeated every other night, as only the adults are killed, the pupae in the soil not being affected. Sodium cyanide may be used for fumigation, but the dose should not be reduced below 1 oz. per 1,000 cubic feet; in leaky greenhouses 1–2 oz. will be required to kill the midge. Violets can withstand a heavier dosage than other plants, but when applying an increased amount the house should not be left closed over night.

BRITTON (W. E.) & ZAPPE (M. P.). **An Outbreak of the Arbor-vitae Leaf Miner,** *Argyresthia thuiella,* **Packard.**—*Conn. Agric. Expt. Sta., New Haven,* Bull. 234, 1922, pp. 157–160, 3 plates.

During the outbreak of *Argyresthia thuiella,* Pack., on arbor-vitae trees in Connecticut the injury was very severe, in some cases almost all the chlorophyll being destroyed. Hibernation apparently occurs in the larval stage in the leaf-mines. Pupation takes place early in May, and the adults begin to emerge about 20th May. The first eggs were found on the 9th June, by the 21st June they had hatched, and the young larvae were mining the leaves. They enter the leaves under the edge of the base next the twig, and make mines between the upper and lower epidermal layers. Parasites of this moth that have been bred in Connecticut are the Chalcid, *Pentacnemus bucculatricis,* How., and the Braconid, *Apanteles bedelliae,* Vier. Spraying experiments were carried out with the following insecticides: Lead arsenate, lime-sulphur, Scalecide, kero-spray, fish-oil emulsion, carbolic acid emulsion and nicotine sulphate. All the trees treated with these insecticides had their usual treatment of nicotine and soap a week later. With the exception of carbolic acid and lead arsenate two applications were made, one 24th May and the other 4th June. Counts were made in the autumn of the larvae in the leaves of the younger trees. The results were inconclusive.

ZAPPE (M. P.). **Tests of Materials for the Control of Wireworms.**—*Conn. Agric. Expt. Sta., New Haven,* Bull. 234, 1922, pp. 163–165.

The substances tested were turpentine emulsion, fish-oil emulsion, carbolic acid emulsion, gum-camphor mixture and naphthaline flakes. The method adopted is described. Apparently none of these remedies was of any value.

BRITTON (W. E.), ZAPPE (M. P.) & STODDARD (E. M.). **Experiments in Dusting versus Spraying on Apples and Peaches in Connecticut in 1921.**—*Conn. Agric. Expt. Sta., New Haven,* Bull. 235, February 1922, pp. 209–226, 6 plates, 3 figs.

Experiments in the relative value of liquid and dust sprays were conducted in Connecticut in four apple and two peach orchards. In each case two treatments were given after blossoming on apples and three on peaches. In the apple orchards the chief pests were codling moth [*Cydia pomonella*], plum curculio [*Conotrachelus nenuphar*], apple maggot [*Rhagoletis pomonella*], false apple red-bug [*Lygidea mendax*], and Aphids, as well as various chewing insects. The dusts used were sulphur-lead, sulphur-lead-nicotine, and Sanders' dust. The liquid spray contained liquid lime-sulphur, lead arsenate and nicotine sulphate. In nearly all cases the best apples were obtained from the sprayed plots. Both spray and dust gave good results against *C. pomonella* and other chewing insects; neither controlled the curculio. The spray was more effective against fungi.

On peaches the chief pests were curculio and fungous diseases. The only spray used was atomic sulphur, and the dusts were sulphur and sulphur-lime-lead arsenate dust. The dusted plots gave slightly better fruit than the sprayed plots. At present dusting is more costly than spraying in both peach and apple orchards.

WALDEN (B. H.). **The Mealy Flatas,** *Ormenis pruinosa,* **Say, and** *O. septentrionalis,* **Spin.**—*Conn. Agric. Expt. Sta., New Haven,* Bull. 234, 1922, pp. 189–190, 1 plate.

Ormenis pruinosa, Say, and *O. septentrionalis,* Spin., have been unusually abundant during the past season. Although not generally considered of economic importance, when they occur in large numbers these Flatids cause a certain amount of injury by sucking the juice from the stems of a large variety of plants. They have been recorded from about thirty different plants, including grape, currant and gooseberry. The eggs are laid in late summer or early autumn in slits just under the bark of the twigs, forming ridges an inch or more in length. The adults emerge early in July, there being only one brood a year. The habits of the two species are very similar, *O. septentrionalis* occurring slightly later in the season.

In the case of injury to cultivated plants, spraying with kerosene emulsion or 40 per cent. nicotine sulphate is advocated. The eggs may apparently be destroyed by pruning. Grape-vines pruned to one or two buds of the previous season's growth showed a much slighter infestation than adjoining vines that had not been so treated.

THEOBALD (F. V.). **Entomological Department.**—*Ann. Rept. 1920-21, Research & Advisory Dept., S.E. Agric. Coll., Wye,* pp. 10-13. [Received 23th April 1922.]

The damage caused by cutworms or surface larvae has been so great in Kent that experiments have been carried out for the destruction of them before corn is sown. The value of poultry for clearing land where potatoes, mangels or swedes have been grown has been clearly proved. *Coleophora nigricella* (apple and plum case-bearer) has caused much trouble during the past two years. Winter treatment has proved valueless. Although in America a similar moth has been unaffected by spring spraying, experiments showed that while lead arsenate had no effect, nicotine wash and nicotine-sulphate and soap destroyed 85 and 92 per cent. respectively.

Tests against the rosy apple aphis [*Aphis kochi,* Schout.] have shown that much good can be done by late winter or early spring spraying with hot lime, great numbers of the young Aphids being killed before they can protect themselves in the curled foliage. Much better results can be obtained by spraying in the autumn to kill the males and ovipositing females, which occur in great numbers under the flat leaves. Soft soap (10 lb. to 100 gals. water) is as effectual for this purpose as paraffin emulsion. An efficient carrier for dry spray has been found in fuller's earth, which can be obtained from the Kent mines at £3 a ton. An investigation into the economic status of millipedes in connection with vegetables, hops and fruits shows that they do feed upon sound tissues if these are sufficiently soft. The complete life-cycle of *Anuraphis prunina* (leaf-curling plum aphis) has been worked out, its secondary food-plant proving to be forget-me-not [*Myosotis*].

Experiments with calcium arsenate and soap prove this wash to be inferior to lead arsenate. A comparison of pure nicotine wash and nicotine sulphate has shown the latter to be quite as effective, to have more lasting powers when mixed with soft soap, and to be much cheaper.

BRITTON (W. E.) & ZAPPE (M. P.). **Miscellaneous Insect Notes.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 194–202, 4 plates.

Eulia juglandana, Fern., occurred on hickory trees, apparently for the first time on record in Connecticut. Considerable injury was done to maize by *Papaipema nitela*, Gn., which is also recorded from tobacco. A weevil, *Mononychus vulpeculus*, F., was found breeding in the seed pods of Japanese iris. The Geometrid, *Aplodes mimosaria*, Gn., and the Chrysomelid, *Colaspis favosa*, Say, injured bayberry; spraying with lead arsenate is advocated against the latter, and also against *Typophorus* (*Paria*) *canellus*, F., feeding on the tender terminal leaves of Japanese walnut. Witch hazel was attacked by the Noctuid, *Conistra indirecta*, Wlk. Great damage was caused to willows by *Plagiodera versicolor*, Laich., which may be controlled by spraying with arsenicals. White pine was injured by the Scolytid, *Ips calligraphus*, Germ., but this beetle is thought to be only a secondary cause of death of the trees. Injury to larkspur plants previously thought to be of bacterial origin is now considered to be due to a mite, probably *Tarsonemus pallidus*, Banks. The Pyralid, *Omphalocera dentosa*, Grote, shows a preference for the common barberry (*Berberis vulgaris*), but it occasionally attacks Japanese barberry (*B. thunbergii*). *Euphoria inda*, L. (bumble flower beetle) is recorded as injuring sweet maize by eating the immature kernels. The beetle appears in late summer or early autumn and breeds in rotting turf, manure and other decaying matter. There is only one generation a year. Hand-picking is the best means of controlling this pest.

The adults of *Monarthropalpus buxi*, Lab. (box leaf-miner) emerge towards the end of May and beginning of June, at which time remedial measures should be applied. Those recommended are spraying both surfaces of the leaves with common molasses diluted with three parts of water, which causes the midges to become entangled, or spraying with Black-leaf 40 and Black-leaf resinate alternately, each diluted with 500 parts of water. This treatment should be repeated four or five times during the period of emergence of the adults. Hibernation occurs in the larval stage.

Coptodisca splendoriferella, Clem., occurs throughout the northern United States from Maine to Minnesota, and has also been recorded from Canada. The eggs are laid on apple leaves in May, and the young larvae make a blotch-shaped mine in the leaf. When nearly full grown the larva lines the mine with silk and cuts out the case in the shape of a shield; these cases are attached to the bark and hibernation occurs in them. There are two broods each season. Spraying orchard trees with lead arsenate, including nicotine sulphate, will probably reduce the injury.

Syntomaspis druparum, Boh., was discovered on apples in Connecticut during 1921. The winter is passed in the larval stage in the seeds, but although there is only one generation of this Chalcid a year, only certain individuals emerge as adults the following spring. More than half lived over in the seed for two winters before transforming. All fallen fruit, especially of wild seedlings and crab apples, should be destroyed. If the apples are made into cider, the pomace should be destroyed, as the larvae in the seeds will probably not be killed in the press.

Termites are recorded as interfering with the telephone service by eating the insulation of the wires, the species concerned was probably *Reticulitermes flavipes*, Kollar.

A serious outbreak of *Leptobyrsa rhododendri*, Horv. (rhododendron lace-bug) occurred during 1921 in a Connecticut nursery. The insects suck the juices from the leaves, causing the appearance of whitish spots. The leaves have a tendency to curl, and in extreme cases turn brown. Eggs are found along the midrib on the lower surface of the leaf. Sprays that have proved effective include nicotine sulphate and kerosene emulsion.

Parandra brunnea, F., caused serious injury to sugar maple trees; it has been recorded as infesting many other trees and as damaging chestnut telephone poles. The adult beetles emerge during July and August and lay their eggs in small punctures in the wood near wounds and decayed places. The eggs hatch in from two to three weeks, and the larvae bore into the wood. Pupation occurs in a cell at the termination of the burrow. It is thought that three years are required for this Cerambycid to develop from the egg to the adult. As the attack generally follows injury by other species or some other mutilation, care must be taken to protect the trees and particular attention must be given to wounds.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa, Pretoria,* iv, no. 4, April 1922, pp. 300–304.

Heterodera radicicola (root gall Nematode) is a very common pest in all four Provinces of South Africa, and is the cause of swollen roots of tomatos, tobacco and other plants. The roots of grape-vines and various trees are also liable to severe infestation. The failure of susceptible vegetable plants is often traceable to infestation of the surface roots of neighbouring fig or peach trees. This Nematode thrives best in sandy soil, especially when a high water-table or other condition prevents the formation of deep feeding roots. A record is given of an investigation of an infested farm and the remedial measures that were recommended.

Lema bilineata (tobacco leaf slug) is rapidly spreading. Although normally the larvae leave the plants to pupate in the soil, it has been proved that if the food-plant is cut and bundled the mature larvae will make their cocoons and complete their transformations in the bundle.

Aphelinus mali, the parasite of the woolly aphis [*Eriosoma lanigerum*] has increased at Pretoria during mid-summer. This insect can be introduced into a new place by transfering a few twigs bearing parasitised Aphids, but pernicious scale [*Aspidiotus perniciosus*] is so common round Pretoria that such transfers may be the cause of spreading this pest. *Eriosoma pyricola* (woolly pear aphis) has been introduced into the country. It is a widespread and serious pest in the western States of America, where it is thought to have been introduced on pear stocks from France.

Maize has been considerably damaged by *Adoretus cribrosus*, which feeds on the plants after dark, hiding in the soil at the foot of the plant by day. It is a common pest of grape-vines, rose bushes and fruit trees. Early planted maize, though considerably defoliated, was not so seriously injured as late sown fields. No inexpensive and effective treatment under such conditions can be proposed. An account is given of the use of an old remedy against the maize stalk-borer

[*Busseola fusca*] by treating the plants with a dip called "Little's Fluid Sheep Dip," diluted at the rate of one measure of dip to 100 measures of water. This was applied from a wine bottle, with a quill through the cork, so that a small quantity of the diluted dip can be well shaken into the heart of the plant. The amount should vary according to the size of the plant, about a teaspoonful being enough for an 18-in. plant.

Beneficial Insects.—*Minist. Agric. & Fisheries, London,* Misc. Pubns. no. 37, 1922, 11 pp., 2 plates. Price 4*d*. net.

A general account is given of the five kinds of insects that are beneficial to the farmer, namely, Coccinellids, the various families of parasitic Hymenoptera, Tachinids, Syrphids and Chrysopids, and of their manner of attacking Aphids, Coccids and other injurious insects. The destruction of these beneficial insects should be avoided whenever possible; new kinds of parasitic or predacious insects should be introduced into countries where they do not already occur; and those already established should be increased in numbers by every possible means. The last method is not often very successful, except in a few instances, such as in the United States, where Coccinellids are brought down from the hills to the valleys before the time of their normal migration.

In the case of the apple blossom weevil, *Anthonomus pomorum*, L., which is one of the most serious apple pests in England, if the "capped" blossoms are collected before the beetles have emerged and kept under muslin cages, many Ichneumonid parasites (*Pimpla pomorum*, Ratz.) may be obtained. This method has been successful in France.

Rhynehart (J. G.). **On the Life-history and Bionomics of the Flax Flea-beetle (*Longitarsus parvulus*, Payk.), with Descriptions of the hitherto unknown Larval and Pupal Stages.**—*Sci. Proc. R. Dublin Soc., Dublin,* xvi, no. 39, 13th April 1922, pp. 497–541, 2 figs., 5 plates.

The investigations here recorded were begun in 1920 with a view to finding a suitable check on the ravages of *Longitarsus parvulus*, Payk. (flax flea-beetle). Particulars are given of the life-history, synonymy and distribution of this species. In Ireland it is common all over Ulster, and of recent years has become a pest in flax-growing districts in Co. Cork.

The principal damage is caused by the adults, which feed on the cotyledons and growing points of seedlings, which are either killed and stunted or become branched. Newly emerged adults in August attack old flax stalks. The larvae feed on the youngest parts of the roots. The occurrence of this Chrysomelid as a pest and the range of its food-plants are discussed. Cultivated flax is the favoured food-plant, but clovers, grasses and species of wild flax are also attacked. It is usually thought that dry, warm weather in May, after weather not conducive to the thorough cultivation of seed-beds, will give rise to serious attacks. The author considers that the prevailing weather in May or June will determine to a large extent the infestation of the following spring.

A full description is given of the immature stages. Hibernation occurs in the adult stage beneath grass near dry fences, in crevices in walls, etc. in October or late September, the beetles emerging in April.

Early in May they migrate to the fields, depositing eggs in clusters in the soil for about six weeks, these hatching in 15–18 days. The larvae are comparatively active, though fragile and highly susceptible to excessive moisture. The larval stage lasts 23–28 days, the pupal stage 10–15 days, the total life-cycle being 57-65 days. There is one generation a year. In 1921 larvae were found in June and July, and pupae from the end of June to the end of August. The adults began to emerge about the end of July. The maximum emergence in 1920 was in the last week in August and the first days of September, but in 1921 it was about the 25th July. The adults are active and are seen in great numbers in sunny weather. Flight occurs in spring, when they leave their winter quarters and go to the crops, and again towards the end of the season when the crop has been pulled. During active feeding flight rarely occurs; the beetles hide beneath flax leaves when not feeding.

Natural enemies include various birds. Gravid females are devoured by a Carabid, *Bembidium lampros*, which possibly also eats the eggs. The adults are also attacked by larval mites, *Trombidium* sp.; one specimen found was believed to be a larval form of *Rhyncholophus phalangeoides*. The larvae and pupae were attacked by Tyroglyphid mites in captivity, but their presence was probably accidental. They are apparently not attacked by Hymenopterous or internal parasites.

Remedial measures include the production of strong, vigorous growing young shoots by using suitable seed, manure and cultivation. Very early sowing is not desirable in districts where the beetle is prevalent. Small areas sown a week earlier than the main crop will serve as trap crops. Beetles may be destroyed by sweeping over seedlings in bright sunlight with a sack or light white board coated with tanglefoot or similar material. Trap plots should be thoroughly cultivated in late June to kill any eggs laid in May and June. Attacked seedlings may be stimulated by applying light dressings, one of which has already been noticed [*R. A.E.*, A, ix, 447], and experiments with others are described, though they have afforded no obvious protection.

BRÈTHES (J.). **El Bicho de Cesto** (*Oeceticus kirbyi* **var.** *platensis*, **Berg). Campaña 1920-21. Dos nuevos Parásitos.** [The Bagworm. Work done in 1920–21. Two new Parasites.]—*Inst. Biol. Soc. Rural Argentina, Buenos Aires*, 28 pp., 23 figs., 1 coloured plate, 1 map. [Received 28th April 1922.]

As a result of the examination of a large amount of material the author states that the Argentine bagworm, hitherto known as *Oeceticus platensis*, Berg, is not specifically distinct from *O. kirbyi*, of which he proposes to treat it as a variety. The smaller size, lighter colour and other differences that increase towards the south are simply due to the climate. Much of the information given has already been noticed [*R.A.E.*, A, vi, 315, 517; viii, 298]. In the campaign of 1920–21 the Tachinid parasite, *Parexorista caridei*, Brèthes, was utilised on a larger scale than before, more than 300 lots of parasitised material being sent out, and the fly is now established throughout the province of Buenos Aires, except on a part of the coast. Though less important, *Tetrastichus platensis*, Brèthes, destroys large numbers of bagworms, especially when they are still small. An Acarid, *Pediculoides ventricosus*, Newp., comes next in order of importance; its action is chiefly noticeable when the bags contain the eggs of the moth. The twelve other parasites of this moth that are already known

are of much less value. Two new ones are described, ***Parasetigena platensis*** and ***Gymnostyla argentina***, both from the province of Buenos Aires. There is now reason to think that the injury done by the bagworm can be checked in a very large measure.

JARVIS (E. H.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl., Brisbane,* xvii, pt. 3, March 1922, pp. 103–105.

Suggestions on the use of carbon bisulphide as a fumigant for cane grubs by means of the "Dank's injector" are given. Injections in light soils among young plants should not be closer than 6 in. from the plants and 18 in. apart, and need only be applied on one side of the stools. They should not be applied during high temperatures or when the soil is dry or cracked. In red volcanic country treatment is best a few days after heavy rain, and in sandy soils after a light rain. The soil should not be cultivated for at least a week after treatment. An application of carbon bisulphide improves exhausted soils and destroys certain injurious bacteria. Before application the roots should be examined to ascertain the depth at which the grubs are working, and the injections then made about an inch or two above them.

Investigations on the longevity of beetles by Labitte [*R.A.E.*, A, v, 20] are quoted. The adult *Melolontha melolontha*, a beetle closely allied to *Lepidoderma albohirtum* and of similar habits, lives only 31 days, and in the past seven years the author has found that *L. albohirtum* does not live longer than three or four weeks.

Scolia formosa, Guér., is recorded as a new parasite of *L. albohirtum*. This wasp lived eight weeks in confinement and laid 24 eggs on larvae of *L. albohirtum*, but refused to oviposit on those of *Lepidiota frenchi*. The life-cycle occupied 108 days, the egg stage lasting 3 days, the larval 11 and the pupal 94. It is somewhat rare, and may therefore be subject to attacks by hyperparasites. As it occurs in other countries, it is likely that *Macrosiagon pictipennis*, Lea, a Rhipiphorid beetle that is parasitic on wasps of the genus *Campsomeris*, may find *S. formosa* a readily accessible host.

CURRAN (C. H.). **Revision of the *Pipiza* Group of the Family Syrphidae (Flower-flies) from North Mexico.**—*Proc. Cal. Acad. Sci., San Francisco,* 4th Ser., xi, no. 16, 31st December 1921, pp. 345–393, 30 figs.

Of the 49 species dealt with, 31 are described as new species and one as a new subspecies. Keys are given to the genera and species of *Pipizella* and *Pipiza*, the males and females of *Heringia* and *Cnemodon* being dealt with in separate keys.

YOTHERS (W. W.). **Sulphur Compounds for Rust Mites.**—*Florida State Hortic. Soc. Proc.,* xxxiii, 1920, pp. 128–133. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlvi, no. 4, March 1922, p. 355.)

It is reasonably certain that dry sulphur compounds will give satisfactory results in controlling rust mites if used on the basis of their sulphur content. In all practical tests where these were used so that the sulphur in solution was very much less than that contained in lime-sulphur solution, the latter was more effective. Future experiments may show that they can be used slightly under the

sulphur content basis. No injury followed any test. It is very doubtful if dry soda sulphur can be used on the sulphur content basis, because of liability to damage. This form appears to fill a most important place in that it mixes thoroughly with all oil emulsions, thus making a combination spray for whitefly, scale-insects, and rust mites. Citrus growers are advised to test on a small scale all these dry forms on two distinct bases, namely, on sulphur content basis and on cost basis.

STRAŇAK (F.). **Dnešní stav kalamity způsobené zavíječem řepovým.** [Measures against *Phlyctaenodes sticticalis*.]—Separate from *Čsl. Zemědělce, Prague*, iii, no. 13, 25th August 1921, 7 pp., 7 figs. [Received 3rd April 1922.]

The various mechanical devices employed in Czecho-Slovakia for the destruction of *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., are described and illustrated.

RAMBOUSEK (F.). **Letošní kalamita způsobená zavíječem řepovým.** [This Year's Injury by *Phlyctaenodes sticticalis*.]—*Ochrana Rostlin, Prague*, i, no. 4, October 1921, pp. 1–5, 2 figs. [Received 3rd April 1922.]

The work of previous authors with regard to *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., in various countries and its recent introduction into Czecho-Slovakia are discussed.

The remedial measures suggested are spraying with barium chloride or Urania green in order to poison the larvae, and the use of deep furrows containing unslaked lime, shavings or sawdust, mixed with kainit or some other poison. The migration of the larvae may possibly be prevented by laying down strips of canvas soaked in tar. The pupae should be collected from the ground and destroyed.

FARSKY (O.). **Může skákač bukový ohroziti u nás pěstování buků?** [Damage by *Rhynchaenus fagi* to Beech Trees.]—*Ochrana Rostlin, Prague*, i, no. 4, October 1921, pp. 5–7, 1 fig. [Received 3rd April 1922.]

When the adults of *Rhynchaenus* (*Orchestes*) *fagi*, L., emerge from hibernation, they feed on the leaves of beech from about April to June. The eggs are generally laid singly on the leaves near the mid-rib. The larvae eat through the parenchyma and mine in the leaf, feeding for about three weeks before pupation, which lasts about ten days. The weevils emerging in the summer are very voracious feeders, attacking almost any vegetation, including deciduous trees and conifers, as well as shrubs, grasses, etc. They hibernate under leaves on the ground, in cracks in the bark, or in the mines made in the leaves by the larvae.

Ochranná opatření proti můře osenní. [Measures against *Agrotis segetum*.]—*Ochrana Rostlin, Prague*, i, no. 5–6, December 1921, pp. 2–5, 3 figs. [Received 3rd April 1922.]

Euxoa (*Agrotis*) *segetum*, Schiff., caused serious damage to potatoes and other crops during 1921. The more important preventive measures are the improvement of crops by the judicious use of artificial manures,

and the collection of the larvae in the field. Two generations a year occur in Czecho-Slovakia. Hibernation takes place in the larval stage in the ground, the first adults appearing about the middle of May.

RAMBOUSEK (F.). **O zavíječi řepovém.** [*Loxostege sticticalis*, **L.**]—*Ochrana Rostlin, Prague*, i, no. 5–6, December 1921, pp. 8–9. [Received 3rd April 1922.]

Microtachina erucarum, Rond., is recorded as a parasite of *Loxostege sticticalis*, L., as many as 30 per cent. of the larvae being attacked in some districts of Czecho-Slovakia. Other enemies are the parasite, *Phora rufipes*, Mg., and *Microklossia prima*, which causes an epidemic disease in the caterpillars [*R.A.E.*, A, iv, 303]. In view of these parasites and of a disease attacking the adults, no great damage is expected from the overwintering brood, but there is always a danger of fresh infestations by the winged adults migrating from Galicia and the Ukraine.

ANTONIN (S.). **Kotázce o ochraně kultur zemědělských proti záplavám škodlivého hmyzu.** [The Protection of Economic Plants against Insect Pests.]—*Ochrana Rostlin, Prague*, ii, no. 1, March 1922, pp. 4–7.

The distribution of, and damage caused by various insect pests such as *Liparis* (*Psilura*) *monacha*, *Loxostege* (*Phlyctaenodes*) *sticticalis*, *Eriosoma* (*Schizoneura*) *lanigerum*, *Euxoa* (*Agrotis*) *segetum* and *Eulecanium* (*Lecanium*) *corni* in Czecho-Slovakia are described, and the need for systematic remedial measures is indicated. The importance of birds to agriculture is also discussed.

VIELWERTH (V.). **Pandravy.** [*Melolontha melolontha*.]—*Ochrana Rostlin, Prague*, ii, no. 1, March 1922, pp. 9–11.

Melolontha melolontha (*vulgaris*) is widely distributed in Czecho-Slovakia and causes serious damage in both the larval and adult stages. The food-plants include many grain crops and fruit-trees. The life-history of this cockchafer and the injury done by it are described. The remedial measures advocated are the collection of adults and the use of carbon bisulphide against the larvae. Of the latter, 7–8 gm. should be placed in shallow holes in the ground and covered with earth. About six holes are required to the square metre.

SMOLÁK (J.). **Housenčí hnízda bekyně zlatořitné na ovocných stromech.** [Caterpillar-nests of *Nygmia phaeorrhoea* on Fruit-trees.]—*Ochrana Rostlin, Prague*, ii, no. 1, March 1922, pp. 11–12.

A brief account is given of the life-history of *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) and the damage caused by it to fruit-trees in Czecho-Slovakia. Remedial measures include the collection and destruction of the nests and spraying the trees at the beginning of August with 1 lb. Paris green, $2\frac{1}{2}$ lb. lime and 100 gals. water.

Různé zprávy. [Miscellaneous Notes.]—*Ochrana Rostlin, Prague*, ii, no. 1, March 1922, p. 12.

Lepidosaphes ulmi (*Mytilaspis pomorum*) causes damage to many fruit-trees, grape-vines, and currants. The trees should be kept free

from lichen and moss, and the infested branches cut out; the immature stages of the scale may be removed with a brush dipped in petroleum or 6–10 per cent. carbolineum, or the trees sprayed. In this connection petroleum emulsion has given good results, as has a 10 per cent. solution of kainit. The latter was rubbed over the stronger branches and sprayed on the weaker ones.

MJÖBERG (E.). **Over den Rupsenvraat in de Droogschuren en een nieuwe radicale Bestrijdings-Methode.** [Caterpillar Injury in the Tobacco Drying-sheds and a new, radical Method for combating it.]—*Meded. Deli Proefst., Medan*, Ser. 2, no. xvii, 1921, 29 pp., 6 plates, 1 fig.

Tobacco in the drying-sheds of Sumatran estates is attacked by the larvae of *Phytometra* (*Plusia*), *Prodenia* and *Heliothis*, small individuals of the first two causing the most injury. These larvae are brought in with the leaf and continue feeding while it withers. Eggs of *Prodenia* that are brought in also give rise to larvae, but as they require fresh leaves the injury they do is unimportant. The annual loss averages about £158,000 at par, but the author's experiments show that this is preventible at a relatively small outlay. The leaves are fumigated with hydrocyanic acid gas, which in no way affects them, but kills all the larvae. The fumigation chamber must be large enough to render it unnecessary under normal circumstances to operate more than once a day. The generator consists of a receptacle for about two pints of sulphuric acid with a tube leading to a four-pint receptacle (for the potassium cyanide) below it. Both receptacles are inside the building, but the tube connecting them passes out through the wall and back again, being fitted with a stop-cock that can be worked from outside, and allows the acid to reach the cyanide. From the lower receptacle another tube leads outside to a barrel completely buried underground. The bottom of the barrel is perforated so that any liquid can flow down into the ground. This tube is also fitted with a stop-cock outside the chamber, and allows the sludge to pass down to the barrel after fumigation is completed. The cost of fumigation is about one per cent. of the average loss in the absence of such treatment.

DE SEABRA (A. F.). **Études sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées à S. Thomé. xxiii. Note sur l'Importance agricole du *Lymidus variicolor*, Berlioz.**—*Lisbon*, Companhia Agrícola Ultramarina, 1920, p. 8.

A new pest of cacao found in the plantations of San Thomé is the small Chrysomelid, *Lymidus variicolor*, Berlioz, described in 1919 [*R.A.E.*, A, vii, 268]. The adults and also the larvae, which have not yet been studied, feed on, and cause serious injury to, the leaves and pods.

PORTER (C. E.). **Sobre dos Bracónidos Argentinos.**—*Rev. Chilena Hist. Nat., Santiago de Chile*, xxiv, no. 2–4, March–August 1920, pp. 33–34.

The Braconids recorded in this paper are *Apanteles paphi*, Schr., parasitic upon the larva of *Tatochila autodice*, and *A. reedi*, sp. n., on a larva of *Protoparce*.

MERCET (R. G.). **Nota sobre la** *Icerya purchasi* **en España (Hem. Coccidos).**—*Bol. R. Soc. Española Hist. Nat., Madrid*, xxii, no. 1–2, January–February 1922, pp. 136–141, 4 figs.

Icerya purchasi (fluted scale) has recently been discovered in Spain for the first time on *Citrus*, and it is probable that it occurs in many parts of the Provinces along the Portuguese frontier. A general account of this pest is given and of the value of natural enemies and in particular of the Coccinellid, *Novius cardinalis*, in reducing its numbers.

AHLBERG (O.). **Thysanoptera from Juan Fernandez and Easter Island.**—*Nat. Hist. Juan Fernandez and Easter Island, Uppsala*, iii, pt. 2, 1922, pp. 271–276, 2 figs.

The insects collected by the Swedish Pacific Expedition, 1916–17, included five species of Thysanoptera, of which *Sericothrips ineptus* and *Physothrips skottsbergi* from Masatierra are new.

SPIERENBURG (D.). **Een onbekende Ziekte in de Iepen.** [An unknown Disease of Elms.]—*Verslagen en Meded. Plantenziektenk. Dienst, Wageningen*, no. 24, February 1922, pp. 1–31, 4 plates. [Received 1st May 1922.]

The information given here is substantially the same as that in a paper already noticed [*R.A.E.*, A, ix, 386].

GROOT (C.). *Chloroclystis rectangulata*, **L., een voor Ooftboomen schadelijk Rupsje.** [*C. rectangulata*, a Caterpillar injurious to Fruit-trees.]—*Verslagen en Meded. Plantenziektenk. Dienst, Wageningen*, no. 24, February 1922, pp. 32–37. [Received 1st May 1922.]

In recent years some Dutch fruit-growers have thought banding to be ineffective against the winter moth, *Cheimatobia brumata*, owing to the presence of large green caterpillars on banded trees. These larvae, however, are those of *Chloroclystis* (*Eupithecia*) *rectangulata*, L. Existing data on the life-history of this moth being of a conflicting nature, the author kept adults in captivity. The eggs laid by them in the summer did not hatch until the following spring, the first larva being noticed on 18th March. If flower-buds are available, the newly hatched larvae bore into them. One individual can destroy several buds in succession. When the flower-bud is about to open, the larva seeks to hinder this by binding it with a web. Owing to the later development of the apple more of its blossoms are destroyed than in the case of the pear. Injured blossoms soon fall. In the case of the pear the young leaves are also attacked because the larvae are not full-grown by the time that blossoming is over; such injury is rare on the apple. Where flower-buds are not available the larvae feed on and skeletonise the unfolding leaves. Pupation occurs on the trunks and probably in the ground also. It begins in mid-May and lasts about 25 days. The adults remain, by day, on the undersides of branches. Their flight period extends from the end of May to mid-July. Neither banding nor arsenical sprays are useful against *C. rectangulata*, but excellent results are obtained by spraying with an 8 per cent. carbolineum emulsion, applied from January to March.

Ziekten en Beschadigingen van Tomaten. [Diseases of and Injuries to Tomatos.]—*Verslagen en Meded. Plantenziektenk. Dienst, Wageningen*, no. 26, April 1922, 30 pp., 2 tables, 4 plates.

This bulletin issued in view of the increasing cultivation of the tomato in Holland, deals with the commoner diseases and pests—the latter including wireworms, the Nematode, *Heterodera radicicola*, the whitefly, *Asterochiton* (*Aleurodes*) *vaporariorum*, and scale-insects—and with recognised means for combating them.

DEGRULLY (L.). **Deux vieux Ennemis de la Vigne : le Ver gris, l'Altise.** —*Progrès Agric. et Vitic., Montpellier*, lxxvii, no. 18, 30th April 1922, pp. 413–419.

The winter and spring treatments for cutworms in vineyards are discussed. One of the most successful and least expensive methods is to make five or six holes nearly two inches in diameter and about six inches deep around the base of each vine stock, keeping the edges very smooth. Numbers of cutworms are caught in this way and can be crushed with a stick. Carbon bisulphide injections are useful in the winter, but only before the cutworms come to the surface ; a few holes should be made in the ground in December or January to make sure that cutworms are present before the treatment is given.

The preparation of arsenical mixtures for use against *Haltica* spp. is described.

GATTEFOSSÉ (R.-M. & J.). **Un Nouveau Véhicule du Pyréthron.** —*Jl. Agric. Prat., Paris*, xxxvii, no. 17, 29th April 1922, pp. 349–350.

The insecticidal value of extract of *Chrysanthemum cinerariaefolium* has been abundantly proved. It has been found, however, that the usual commercial soft soap is not the best vehicle for applying it. The oleoresin of pyrethrum, which the Japanese chemist Yamamoto has named pyrethron, is a volatile ether accompanied by resin, and resins, acids and ethers are miscible with soap and become more easily soluble in water according to the degree of saponification by alcohol, either free in the soap or added. It is not proved, however, that the resino-alkali combinations and the products of decomposition of the ether are as active as the original substance. The authors have been led to use a neutral vehicle that is itself an insecticide owing to the sulphur it contains, and is entirely miscible in water. It is a sulphonated oil, which is now being manufactured and is patented ; it dissolves pyrethron entirely and does not seem to produce saponification, even after long contact.

There are a number of other vegetable ethers and oleoresins, the value of which as insecticides is touched upon ; in particular lavender is the basis of certain sulphonated products that were used with success in war-time against infestations of lice and mites. Pure pyrethron, which is usually extracted in the proportion of 6 per cent. of the pyrethrum flowers, is an expensive substance (costing about £5 per lb.), and, therefore, fresh sources are being tried for obtaining it. In many cases the oleoresins obtained from French and exotic plants, although valuable as insecticides, are accompanied by a very strong odour, which might detract from their usefulness. The actual proportion of oleoresin in pyrethrum-soap is about 1 per cent. ; this is a small proportion considering that the sulphonated oil now used will dissolve

15 or 20 times the strength of cheaper aromatic oleoresins from plants other than pyrethrum. The latter are distinctly less active, but their advantage lies in their lower cost. The sulpho-aromatic insecticide is eight times more active than pyrethrum-soap. It is hoped that other workers will make chemical tests of the resistance of pyrethrum to alkalis, and will also experiment with oleoresins other than those obtained from pyrethrum.

KUNKEL (L. O.). **Insect Transmission of Yellow Stripe Disease.**—*Hawaiian Planters' Record, Honolulu,* xxvi, no. 2, April 1922, pp. 58–64, 1 fig.

With a view to ascertaining by what means the yellow stripe or mosaic disease is spread to healthy sugar-cane, experiments were undertaken with *Aphis sacchari*, Zehnt. (cane aphis), *Perkinsiella saccharicida*, Kirk. (cane leafhopper), *Peregrinus maidis*, Ashm. (corn leafhopper) and *Aphis maidis*, Fitch (corn aphis). The two former do not carry the disease. *Peregrinus maidis* can carry the disease from maize to maize, but does not appear to carry it from maize to cane or from cane to cane.

The results obtained by Brandes [*R.A.E.*, A, viii, 370], that *A. maidis* can carry the disease to cane, were confirmed. This Aphid does not thrive on sugar-cane in Hawaii, and 11 days is the longest period it can live on the plants. It is not believed that it can invade cane fields to such an extent as to be of importance in the spread of the disease, unless other suitable food-plants are in or near them. In 1921, mosaic disease spread rapidly amongst young cane plants, and near the field some goose grass (*Eleusine indica*) was found infested with *A. maidis*, and some of the plants had the disease. This Aphid is recorded in Java as a pest of sugar-cane. Its known food-plants are maize, *Sorghum*, broom corn, barley, wood sorrel (*Oxalis* sp.), foxtail (*Setaria glauca*), *Panicum* spp., knotweed (*Polygonum pennsylvanicum*), *Eleusine indica*, and the club rush (*Scirpus maritimus*). In Hawaii, mosaic disease is known to occur on sugar-cane, *Sorghum*, maize, Sudan grass, *Andropogon* sp. and *Eleusine indica*.

All crops harbouring this Aphid and grasses subject to the disease should be grown at a distance from sugar-cane fields, which should be kept free from weeds and wild grasses.

A bibliography of the mosaic diseases of plants that are carried by insects is given.

MUIR (F.). **Direct and Indirect Injury to Plants by Insects.**—*Hawaiian Planters' Record, Honolulu,* xxvi, no. 2, April 1922, pp. 65–66.

The various ways in which insects can injure plants are described. Mosaic disease is an example of damage done by foreign bodies that are introduced into plants by insects. In Hawaii, this disease is not so serious as it is in Porto Rico, which may be due to the presence of certain insects in the latter island that convey the disease directly from unhealthy to healthy sugar-cane, whereas in Hawaii it is conveyed by occasional visitors to the plants.

In Trinidad, the damage done by the Cercopid leafhopper [*Tomaspis saccharina*] is due to the adults feeding on the leaves, and causing them to die.

All insects should be kept out of the Island, except those already demonstrated as being beneficial, as apparently harmless insects

may be conveyors of diseases. The utmost care should also be taken if canes are imported. On account of their method of feeding, leaf-hoppers and other Rhynchota are the insects most liable to convey disease.

WILLIAMS (F. X.). **Notes on some Enemies of the Nut Grass in the Philippines.**—*Hawaiian Planters' Record, Honolulu,* xxvi, no. 2, April 1922, pp. 95–97.

The most obnoxious of tropical sedges, *Cyperus rotundus* (nut grass), is little affected by its enemies, which in the Philippines include one or two species of fungus (*Puccinea*), a mealy-bug, a weevil [*Athesapeuta*], and two or three species of Lepidopterous larvae.

The mealy-bug is a small species that lives on or near the base of the leaf-sheaths and on the bulbous portion below the ground. Locally it may be quite abundant. In November 1920, during heavy rains, few individuals were found on the bulb, but in June and July all were at the base of the plant and many were young. A very similar mealy-bug was found at the base of the stems of *Imperata cylindrica* var. *koenigii* among grasses mixed with nut grass. The weevil is more plentiful than the moth borers, though none are abundant. The larvae work into the bulb from above and kill the plant. They pupate in the bulb, and the observations were made in November and December.

There appear to be two species of Tortricid moths, the habits of which are similar to those of the weevil. They are much smaller than *Nacoleia* (*Omiodes*) *accepta* (sugar-cane leaf-roller) of Hawaii. Adults were reared from larvae, but none from egg to adult. What the author considers are the eggs of one of these species are laid in a line on the leaves and slightly overlap. On hatching, the larva embeds itself in the tissue, working downwards and eventually tunnelling the axis as far as the bulb. Pupation occurs in the stem. A small Braconid, resembling an *Apanteles*, attacks the caterpillar and spins a cocoon near it.

A small Tineid moth was reared in a jar containing nut grass, but its early stages were not observed. No Coccids of the genus *Antonina*, which occur on nut grass in Australia, were found.

It is not considered that the subject has been sufficiently studied to enable a decision to be made as to introducing these enemies into Hawaii.

WHEELER (W. M.). **A Study of some Social Beetles in British Guiana and of their Relations to the Ant-plant** *Tachigalia*.—*Zoologica, New York,* iii, no. 3, 24th December 1921, pp. 35–126, 12 figs., 5 plates. [Received 1st May 1922.]

The complicated inter-relationship of the numerous insects and their parasites and satellites infesting the young shoots and leaves, especially the leaf petioles, of *Tachigalia* is discussed. The insects are divided into two series, those that use the plants as dwellings and a source of food, comprising ants, social beetles and Coccids, which are the most important and without exception belong to a single species, *Pseudococcus bromeliae*, Bch., and those that use them as hiding places, etc., such as miscellaneous Arthropods and ants. The latter's relations are of five kinds, defoliators, attendants of Homoptera, inquilines, thief ants, which attack the larvae of the social beetles and small colonies of the inquilines, and ants that are definitely attached to the *Tachigalia* as their host-tree.

The two social beetles are the Cucujids, *Coccidotrophus socialis*, Schwarz & Barber, and *Eunausibius wheeleri*, Schwarz & Barber. These feed both on the nutritive parenchyma in the leaf petiole and on the saccharine excrement of the Coccids. A brief description of all stages of *C. socialis* is given together with its life-history and habits. Notes are given on the enemies of the beetles and the Coccids that they cultivate and the decay of colonies. Their eventual extinction is due to ants, especially *Solenopsis altinodis*, Forel, that destroy the beetles and to predators and parasites that destroy the Coccids. In a few beetle colonies a number of larvae of a predatory Coccinellid, *Scymnus xantholeucus*, Schwarz & Barber, have been observed, and abundant enemies of the Coccids are the Cecidomyiid, *Diadiplosis pseudococci*, Felt, and the Encyrtid, *Blepyrus tachigaliae*, Brues. *E. wheeleri* is briefly described ; it is rarer than *C. socialis*.

The activities of these beetles are reviewed in the light of knowledge concerning other members of the family to which they belong, and the social life among the Coleoptera and the development of the feeding habits and behaviour of social Cucujids are discussed.

This interesting paper cannot be properly dealt with in a summary and should be read in the original.

WHEELER (W. M.). **Notes on the Habits of European and North American Cucujidae (sens. auct.).**—*Zoologica, New York*, iii, no. 5, 24th December 1921, pp. 173–183. [Received 1st May 1922.]

Notes are given on the habits of European and North American CUCUJIDAE, including *Silvanus (Oryzaephilus) surinamensis*, L., *S. (O.) mercator*, Fauvel, *S. (O.) bicornis*, Erich., *S. (O.) gossypii*, Chitt., *S. gemellatus*, Duv., *Cathartus advena*, Waltl, *C. cassiae*, Reiche, *Laemophloeus ferrugineus*, Steph., and *Catogenus rufus*, F.

FELT (E. P.). **A new** *Diadiplosis*.—*Zoologica, New York*, iii, no. 8, 24th December 1921, pp. 225–226. [Received 1st May 1922.]

All stages of *Diadiplosis pseudococci*, sp. n., are described from British Guiana. The larvae were found devouring *Pseudococcus bromeliae*, Bch., in a cavity of the peculiar myrmecophilous tree, *Tachigalia*. This midge closely resembles the West Indian *D. cocci*, Felt, which was reared from larvae infesting eggs of *Saissetia nigra*, Nietn., a scale-insect frequently abundant on the stems of Sea Island cotton.

BRUES (C. T.). **A new** *Blepyrus*.—*Zoologica, New York*, iii, no. 9, 24th December 1922, pp. 229–230. [Received 1st May 1922.]

Blepyrus tachigaliae, sp. n., was bred from *Pseudococcus bromeliae*, Bch., occurring in cavities in the petioles of *Tachigalia* sp. in British Guiana.

MERRILL (G. B.). **Lady Beetles of Florida.**—*Qtrly. Bull. State Plant Bd. Florida, Gainesville*, vi, no. 2, January 1922, pp. 33–46, 15 figs. [Received 2nd May 1922.]

The species of Coccinellids listed as occurring in Florida number 71; the more common of these are dealt with, and their beneficial habits explained. There are two species, however, that are

very serious pests; these are *Epilachna borealis*, F. (squash lady-beetle), which has not yet been recorded as of economic importance in Florida, although it occurs there, and *E. corrupta*, Muls. (Mexican bean beetle), which has been dealt with at length in an earlier paper [*R.A.E.*, A, x, 121]. The latter has not yet reached Florida, but it occurs as near as Thomasville, Georgia; and as it is a strong flier and can travel long distances, quarantine measures are useless, and it is almost certain to appear in northern Florida within a short time.

O'BYRNE (F. M.). **Bordeaux-Oil Emulsion. Its Preparation and Use.**—*Qtrly. Bull. State Plant Bd. Florida, Gainesville*, vi, no. 2, January 1922, pp. 46–58. [Received 2nd May 1922.]

Bordeaux mixture was largely used in Florida in the early days of citrus culture for the control of fungous diseases. It was found, however, that it also killed the beneficial fungi that largely kept the Coccids in check, and that its use was invariably followed by a bad infestation of Coccids. For a long time the problem of a combined fungicide and insecticide, which would kill the injurious fungi and scale-insects at the same time, remained unsolved, but a combination of Bordeaux mixture and oil emulsion has now been evolved that has given very good results. The preparation of a similar mixture has previously been described [*R.A.E.*, A, viii, 401]. This is generally used in the spring months for the control of scab and melanose; the number of scales may increase slightly after its use, and in that case it is advantageous to spray once about the last week in June with a good insecticide. This method is also successful against Aleurodids. The Coccids must be dealt with while they are young, otherwise they are difficult to kill. The Bordeaux-oil emulsion does not separate readily, does not corrode the sprayer and is less injurious to foliage than plain Bordeaux. The comparative cost of home-made mixture and prepared Bordeaux is worked out in detail and shows a great advantage in everything but time in the home-made substance. It should be remembered that the Bordeaux-oil emulsion is primarily a fungicide and should not be used against insects only; it is not a spray mixture for general purposes.

For those who wish to mix their own oil emulsion, the following formula is recommended:—2 U.S. gals. paraffin oil, 1 U.S. gal. water, 2 lb. caustic potash fish-oil soap, 1 lb. ground glue, and 2 to 4 oz. 50 per cent. carbolic acid or liquor cresolis compositi, U.S.P. All the ingredients except the last are put into a receptacle and heated until they boil. The mixture is then emulsified by pumping through a force pump twice. If the mixture is to be kept more than two days, a preservative should be added to prevent fermentation.

WEISS (H. B.). **Additional Nursery Insects.**—*New Jersey State Dept. Agric., Bur. Statistics & Inspection, Trenton*, Circ. 41, February 1922, 17 pp., 6 figs.

Brief notes are given on the life-histories and remedial measures for *Dichomeris* (*Ypsolophus*) *marginellus*, F. (juniper webworm), *Mineola indiginella*, Z. (apple leaf-crumpler), *Galerucella nymphaeae*, L. (pond-lily leaf beetle), *Rhynchaenus* (*Orchestes*) *rufipes*, Lec. (willow leaf-miner), and *Pachypsylla celtidis-gemma*, Riley (hackberry twig-gall).

Pachyscelus laevigatus, Say (desmodium leaf-miner) is common throughout New Jersey, and is found from the last week in May till the first week in July on and near *Meibomia* (*Desmodium*) *canadensis*.

The adult beetles appear during the last week in May and first week in June and feed on the upper surface of the leaves. Pairing takes place during the last half of June, and larvae are found early in July. By the first week in August all the larvae are in cocoons, in which they hibernate among leaves on the ground. Pupation occurs the following spring. Spraying the plants, especially the upper leaf surfaces, at the end of May or beginning of June with lead arsenate is recommended.

Corythucha celtidis, O. & D. (hackberry lace-bug) was first observed in New Jersey in June 1920, depositing eggs on the lower surface of hackberry leaves. The eggs are laid in clusters of 4–18, and hatch in about two weeks. Each of the five nymphal stages requires from 2 to 4 days of very warm weather to complete its growth, cool weather retarding development; the adults emerge in 16–20 days. Two generations occur in New Brunswick. Natural enemies include spiders and predacious bugs. Spraying when the nymphs are first noted on the lower surface of the leaves with 6 lb. whale-oil soap to 50 U.S. gals. water is recommended.

JACKSON (D. J.). **Notes on Aphides from Sutherland. Part I.**—*Scottish Naturalist, Edinburgh*, no. 123–124, March–April 1922, pp. 51–59, 3 figs.

The species recorded are:—*Thripsaphis cyperi*, Wlk., on *Carex goodenovii*; *Pterocomma jacksoni*, Theo., on *Salix caprea*, and attended by ants (*Formica rufa*, L.); *P. populeus*, Kalt. (*pilosa*, Buckt.), on *S. caprea*; *Sipha schoutedeni*, Del Guerc., in abundance on grass (*Holcus*); *Chaitophorus populi*, L., var. *leucomelas*, Koch, on aspen; *C. salicivorus*, Wlk., on sallow (*Salix caprea*), many individuals being attacked by the fungi, *Empusa* (*Entomophthora*) *sphaerosperma* and *Cladosporium aphidis*; *Atheroides hirtellus*, Hal., on hairgrass (*Aira caespitosa*), attacked by *Empusa aphidis*; *A. serrulatus*, Hal., on grass; *Symdobius oblongus*, Heyd., on birch, and attended by *Formica rufa*; *Myzocallis alni*, F. (nec Essig) on alder; *M. coryli*, Goetz, on hazel; and *M. myricae*, Kalt., of which the various forms are described, on *Myrica gale*.

PAVLOVSKY (E. N.). **Description of a Box for collecting and transporting living Insects, etc.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 47–50, 1 fig.

The box here described and illustrated has been used by the author for four years and has proved most useful. The original inventor is not known, and the description includes modifications adopted by the author. The floor of the box is made of wire gauze secured by a fillet of wood running round the lower edges of the box and screwed to the lateral end walls. The rectangular compartments may be subdivided by tin plates. The upper edge of each of these diagonal division plates should be cut to fit the cork protruding through the lid.

This apparatus is very convenient for transporting Arthropods with cannibal habits, and may also be used for sensitive insects such as bumble bees and other Hymenoptera, which will survive in the box much longer than in glass jars with gauze lids. As long as the gauze bottom of the box is placed on the corks of another one, several may be strapped together.

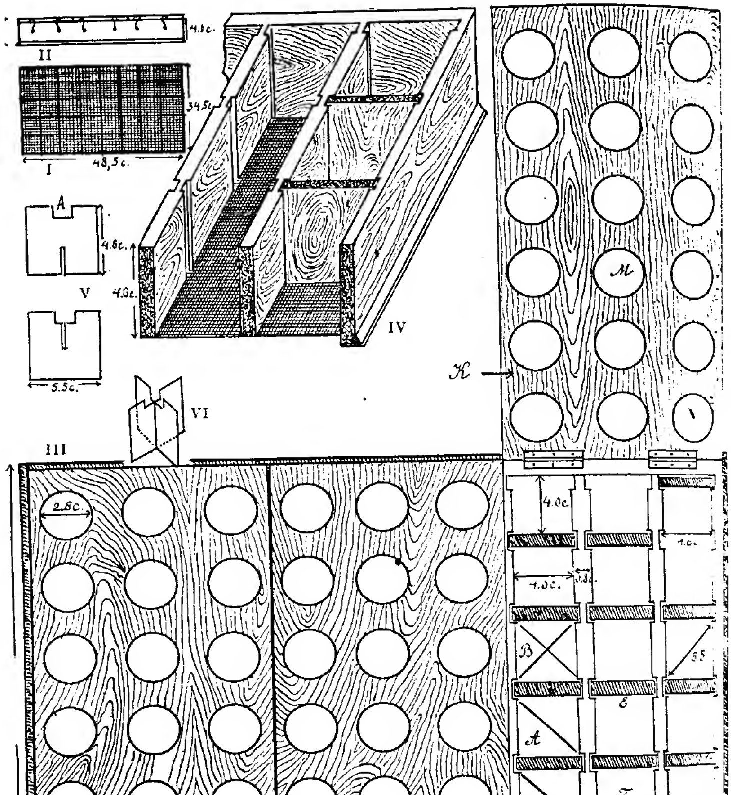

Fig. I. Bottom of original model, showing wire-gauze floor and partitions.

Fig. II. Lateral view of improved model, showing hooks for fastening lid sections.

Fig. III. Plan of improved model, showing lid sections, one of which is open: *A* and *B*, compartments subdivided into two or four parts respectively by the insertion of diagonal plates; *C*, double compartment formed by removal of one movable partition; *D*, space mortice; *E*, movable partitions; *M*, aperture of a compartment.

Fig. IV. Detail of the interior in perspective. The lid is not represented. The wire-gauze floor and wooden fillets are clearly shown.

Fig. V. Tin plates for diagonal partitions of compartments: *A*, incision for reception of part of cork protruding beneath the lid of the box.

Fig. VI. Pair of tin plates interlocked for fourfold subdivision of compartment.

BULLAMORE (G. W.). *Nosema apis* **and** *Acarapis* (*Tarsonemus*) *woodi* **in relation to Isle of Wight Bee Disease.**—*Parasitology, Cambridge,* xiv, no. 1, April 1922, pp. 53-62.

The occurrence of bee diseases prior to 1906 and the outbreak of Isle of Wight disease in that year, as well as the investigations of various authors in order to ascertain the cause of the latter, are reviewed. Acarine disease [*R.A.E.*, A, ix, 275] appears to be less virulent than that which occurred in the Isle of Wight early in the present century. It is possible that most stocks affected with mites, although showing no symptoms of disease, die out sooner or later. Therefore, although *Acarapis* (*Tarsonemus*) *woodi* may not be the cause of Isle of Wight disease, its existence emphasises the superiority of the older system of beekeeping, which considered it undesirable to retain any stock after the third season, the less vigorous colonies being sulphured at an earlier period. Ever since the introduction of the "humane" system by which the redundant bees are distributed as "driven bees" throughout the land, there has been a steady increase in disease, rendering honey production an unprofitable industry. The author does not consider that sufficient suitable material has been examined to disprove the occurrence of *A. woodi* outside Great Britain [*loc. cit.*]. This Acarid will probably prove to be comparatively harmless in countries where two or more honey harvests and constant breeding are the rule, and it is in such districts that endemic centres of the disease may be expected to be found.

MORRIS (H. M.). **On the Larva and Pupa of a Parasitic Phorid Fly—** *Hypocera incrassata*, **Mg.**—*Parasitology, Cambridge,* xiv, no. 1, April 1922, pp. 70–74, 1 plate, 4 figs.

Descriptions are given of the larva and pupa of *Hypocera incrassata*, Mg., parasitising *Bibio marci*. In the laboratory larvae of this Phorid were seen leaving the host in January; they pupated in the soil, and adults emerged from 24th June to 1st July. A comparison is drawn between the larva of *H. incrassata* and those of *Phora bergenstammi*, Mik, *P. rufipes*, Mg., and *P. ruficornis*, Mg., as described by Keilin.

Report on the Prevalence of some Pests and Diseases of Crops in the West Indies during 1920. (Compiled from the Reports of the Principal Local Agricultural Officers.)—*West Indian Bull., Barbados,* xix, no. 2, 31st March 1922, pp. 239-271.

This is a résumé of various local reports, the information from which has already been noticed.

WEISS (H. B.). **A Summary of the Food Habits of North American Coleoptera.**—*American Naturalist, Lancaster, Pa.,* lvi, no. 643, March-April 1922, pp. 159-165, 1 fig.

Of the North American Coleoptera, about 44 per cent. are saprophagous, including Staphylinids, Tenebrionids and Scarabaeids, about 26 per cent. are phytophagous, including Curculionids, Cerambycids and Chrysomelids, and 27 per cent. are predacious. The latter are composed chiefly of Carabids, which include 2,165 species.

In the list given the families have been grouped into classes, based mainly on the predominating larval activities of the members of the family. The number of species belonging to each family is recorded.

EWING (H. E.). U.S. Bur. Ent. **Three new Species of peculiar and injurious Spider Mites.**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 4, April 1922, pp. 104–108.

The new species described are *Paratetranychus heteronychus*, from specimens collected in California and labelled "date mite"; *Eupalopsis pavoniformis* (peacock spider-mite), from Hawaii, on *Hibiscus*; and *Phytoptipalpus transitans*, from Pusa, India, in galls of *Zizyphus jujuba*. The new family PHYTOPTIPALPIDAE is erected for the last-named species.

THOMPSON (W. R.). U.S. Bur. Ent. **On the Taxonomic Value of Larval Characters in Tachinid Parasites (Dipt.).**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 4, April 1922, pp. 85-93, 20 figs.

In view of the practical possibility of the existence of the phenomenon of poecilogony, it is evident that the biologist cannot safely rely on the appearances presented by any given stage of the animal with which he has to deal, and must therefore become thoroughly acquainted with all its transformations. This paper is offered as an example of how possible errors may occur by identifying Tachinids by the study of the morphology of the adults only. In the material forming the subject of this paper three types of larvae were found corresponding to adult females, all determined by Dr. J. Villeneuve as *Paraphorocera senilis*, Rond., the Tachinid parasite of *Pyrausta nubilalis*, Hb. Each of these larval forms is morphologically distinct, the differences in the bucco-pharyngeal armature being well marked, and the material examined is sufficiently extensive to prove the relative constancy of the characters. The differences between the adult flies corresponding to the three forms of primary larvae are slight, and have to do chiefly with the colour and distribution of pollen of the head and thorax.

One of these forms corresponds to *P. gratiosa* described by Brauer and von Bergenstamm, and the other is named *senilis* var. "*c*."

It does not appear advisable to create new specific or varietal names to cover these three types, especially as the synonymy of this species is already fairly extensive.

FENTON (F. A.) & HARTZELL (A.). **Control of the Potato Leafhopper.**—*Iowa Agric. Expt. Sta., Ames*, Circ. 77, March 1922, 4 pp., 5 figs.

Directions are given for the preparation and application of Bordeaux mixture for the control of leaf-hoppers [*Empoasca mali*, Le B.] causing tipburn of potatoes. Although the spray is effective even after the hopperburn has started, it should be applied as soon as the adults are noticed on the vines. In fields of about 20 acres a traction sprayer of 100 U.S. gal. capacity, producing from 150 to 200 lb. pressure at the nozzle and spraying four rows at a time, proved most effective, but in larger fields a power outfit is required. The management of the spray boom is important. The central nozzle should be high enough to enable the tops of the plants to be completely covered by the spray, and the side nozzles should be turned upwards at an angle of about 45° so as to cover thoroughly the lower surface of the leaves. For the earlier sprays the lateral nozzles should point inwards, one slightly forwards and the other slightly backwards, but when the vines are larger they should be turned completely in the opposite

direction. A spray rod with an upturned nozzle at an angle of 45° attached to a 10 U.S. gal. capacity hand spray pump is sufficient for garden purposes.

McDaniel (E.). **The Silver Fish (*Lepisma* spp.). The Habits and Control of this troublesome Household Pest.**—*Qtrly. Bull. Michigan Agric. Expt. Sta., East Lansing*, iv, no. 2, November 1921, pp. 62–64, 1 fig. [Received 3rd May 1922.]

The two species of "silver fish" common in the north-eastern United States are *Lepisma saccharina* and *L. domestica*. The former feeds on starches and sugar; the latter has been observed damaging glue and leather. Both multiply rapidly in houses closed for the summer, and chiefly infest attics, drawers, boxes or bookshelves that are undisturbed for long periods. A paste of starch poisoned with white arsenic spread on pieces of paper has often been used to kill these insects, and dusting with powdered pyrethrum, borax or sodium fluoride will destroy many. Pyrethrum quickly loses its efficacy, and borax is apt to stain materials when left for some time; sodium fluoride is on the whole the most successful, but it is poisonous to human beings and domestic animals.

Horton (J. R.). U.S. Bur. Ent. **A Swallow-tail Butterfly injurious to California Orange Trees (*Papilio zolocaon*, Boisd.).**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 4, April 1922, pp. 377–387, 4 figs.

Though not a major pest, *Papilio zolocaon*, Boisd., occurs throughout the California citrus belt from Vancouver to Arizona and east to Colorado, and does a varying amount of injury to young orange trees. The damage is chiefly caused by the larvae of the first generation; they feed on the young foliage, the favourite food-plant besides orange being garden parsley. Wild umbelliferous plants appear to be the main food-plants outside the orange belt. On *Citrus* the eggs are invariably deposited on new growth. The duration of the different stages varies greatly at different periods of the season. The average incubation period was 9·2 days, with extremes of 4 and 19 days. The larvae occurring from March to May and from November to January live almost twice as long as those occurring from May to October, but as they are less numerous and require less food, they also do less damage. The average life of the larvae was 46·6 days, with 25 days as the shortest and 114 as the longest period. Though the belated individuals apparently require very little food, they cannot survive more than a month without any. Pupation lasts from 7 to 42 days, with an average of 13·2 days during the months of May to October, but about 15 per cent. of those that pupated in May did not transform into adults until April of the following year, averaging 318 days in the pupal stage. The average period for pupation between October and January was 164 days. There are three full generations and a partial fourth each season. True hibernation does not occur in the citrus belt, the development of the stages being merely slowed down as the weather becomes colder. Eggs and adults occur as late as 2nd November, and occasionally larvae may pupate as late as 22nd January. The adults appear in the spring from the end of February to the first week in May, arising from individuals that pupated during the

preceding December and January, and partly from those that pupated in May of the preceding year. The second lot of adults appear from the latter part of May to the middle of June, the third from the end of June to the middle of July, and the last in September and October.

The natural enemies include *Chrysopa californica*, Coq., which sucks the eggs; the bug, *Zelus renardii*, Kol., feeding on young larvae; *Apanteles* sp. parasitising the larvae; and *Chalcis ovata*, Say, which is apparently the most important and infests the pupae.

About the middle of May and again in the middle of July the trees should be inspected for the presence of eggs, and as soon as the first ones begin to hatch, the trees should be sprayed. One thorough application of 6 lb. lead arsenate, 4 U.S. gals. flour paste and 100 U.S. gals. water usually proved sufficient to prevent injury from two broods of larvae. The mixture must be constantly agitated whilst spraying.

DURUZ (W. P.). **The Cherry Fruit Sawfly and its Control.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 4, April 1922, pp. 393–399, 5 figs.

Great damage was caused locally in California during 1920 by *Hoplocampa cookei*, Clarke, which attacks both sweet and sour cherries, plums and prunes, and occasionally apricots and peaches. It will also feed on wild plum and willow. A great deal of the information concerning the life-history of this sawfly is quoted from a paper already noticed [*R.A.E.*, A, i, 178]. Of the various sprays tested, nicotine sulphate in combination with either lime-sulphur or a miscible oil proved the most effective [*loc. cit.*]. The spray should be applied at the time the blossoms are opening. The destruction of wild plum and willows in the vicinity of infested orchards is also advocated.

LARSON (A. O.). U.S. Bur. Ent. **Field Control of the common Bean Weevil** (*Bruchus obtectus*, **Say**).—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 4, April 1922, pp. 400–408, 2 figs.

From the observations here described it is evident that early beans are more susceptible to injury by *Bruchus obtectus*, Say, than later ones. Beans grown under varying conditions such as on highland or flooded areas, on sandy or clay soil, either irrigated or unirrigated, are more or less subject to attack only in so far as they are planted earlier, or mature earlier. The beetles show a preference for ovipositing in the earlier and most mature bean pods. They are short-lived, and most of them emerge from the stored beans during the early part of the summer, lay their eggs on early beans and die. Late beans are infested by the beetles emerging from the early beans or from a second generation from the stored beans. Usually this second generation does not emerge until shortly after the early beans have been harvested.

The spread of the Bruchids from the stored beans to the field should be prevented. Field infestation may also be reduced by planting a trap crop, of the same variety as the main crop, two to four weeks earlier than the other beans. The size of the trap crop must be governed by the size of the bean field, two rows near each side and the middle should be sufficient in a large field. The trap crop should be harvested and fumigated before the adults begin to emerge.

ESSIG (E. O.). **The European Red Mite.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 4, April 1922, pp. 409–411, 1 fig.

Tetranychus citri, McGr. [*R.A.E.*, A, v, 10], which occurs in great numbers on deciduous fruit-trees as well as on *Citrus* in California, is considered to be a synonym of *Paratetranychus pilosus*, C. & F. [*R.A.E.*, A, ix, 293].

A large number of eggs are laid on deciduous fruit-trees in the autumn; on such trees in the cooler parts of the coastal region the winter is passed in the egg stage, whereas on *Citrus* in southern California all stages may be found during the winter. This phenomenon suggests a difference in species or a decided change of habits, which may be due to ecological conditions. A comparison is made of the eggs of *P. pilosus*, C. & F., *Tetranychus telarius*, L., and *Bryobia pretiosa*, Koch, from which it is evident that they are quite distinct and easily separated from one another.

Whether the synonymy will remain as indicated is not certain, but the present facts are sufficient to establish the identity of another European immigrant likely to prove of great importance to citrus cultivation.

STRONG (L. A.). **Bureau of Plant Quarantine. Synopsis of Work for the months of November and December 1921.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 4, April 1922, pp. 413–420.

The pests intercepted during November and December were:—From Idaho, larvae of *Cydia* (*Laspeyresia*) *pomonella* on apples and *Hypera variabilis* (*Phytonomus posticus*) in a potato car. From Louisiana, *Solenopsis* sp. in banana cars; *Cylas formicarius* in sweet potatoes; *Lepidosaphes beckii*, *Parlatoria pergandei* and *Tetranychus* sp. on Florida grapefruit; and *L. beckii*, *P. pergandei*, *Chrysomphalus aurantii* and *Dialeurodes citri* on oranges. From Nevada, *Heterodera radicicola* in potatoes. From New York, Lepidopterous larvae and *Balaninus* sp. in chestnuts; *Myzus rosarum* and *Tetranychus* sp. on roses; *Aspidiotus perniciosus* and *Cydia pomonella* on apples; and *Pseudococcus citri* on *Coleus*. From Oregon, *Cydia pomonella* and *Aspidiotus perniciosus* on apples; *Lepidosaphes ulmi* on cascara bark; *Chionaspis pinifoliae* on fir; and *Lepidosaphes beckii*, *L. gloveri*, *Chrysomphalus aonidum* and *Parlatoria pergandei* on Florida-grown grapefruit. From Washington, *Aphodius pardalis* in a potato car; *Cydia pomonella* and *Aspidiotus perniciosus* on apples; and *Lepidosaphes beckii* on Florida grapefruit. From Florida, *Pseudococcus bromeliae* on pineapples; *Chrysomphalus dictyospermi* on stems of avocados; *C. aonidum* on coconut; and *Lepidosaphes beckii* on grapefruit. From Mississippi, *Dialeurodes citri* on kumquat foliage. From Missouri, *Cydia* (*L.*) *pomonella* and *Aspidiotus perniciosus* on apples; and *Lepidosaphes beckii* and *Parlatoria pergandei* on Florida grapefruit. From Pennsylvania, *A. perniciosus* on apples. From Texas, *Cylas formicarius* on sweet potatoes; and *Lepidosaphes beckii*, *Parlatoria pergandei* and *Chrysomphalus aonidum* on grapefruit. From Utah, *Cydia pomonella* on apples; and *L. beckii* and *P. pergandei* on Florida grapefruit. From Arizona, *Pseudococcus* sp. and *Bryobia pratensis* on ornamental plants. From Alabama, *Chrysomphalus aonidum* and *Lepidosaphes beckii* on oranges, the latter also on tangerines. From Maryland, *Chrysomphalus aurantii* on lemons. From Illinois, *Aspidiotus perniciosus* and *Cydia pomonella* on apples; and *Parlatoria pergandei*,

Lepidosaphes beckii and *Chrysomphalus aonidum* on Florida grapefruit. From Maine, *C. pomonella* on apples. From Massachusetts, *A. perniciosus* and *C. pomonella* on apples. From Nebraska, *L. beckii* on Florida grapefruit. From Vermont, *A. perniciosus* on apples. From North Carolina, *L. beckii* and *C. aonidum* on oranges. From Virginia, *L. beckii* on grapefruit. From New Jersey, *A. perniciosus* and *C. pomonella* on apples. From New Mexico, *A. perniciosus* on apples. From Mexico, *Pseudococcus virgatus* on yucca fruit; *Ceroplastes ceriferus* on Cape jasmin plants; *L. beckii* on oranges; and *Diatraea saccharalis* in sugar-cane. From Central America, *Pseudococcus maritimus*, *Aspidiotus cyanophylli*, *A. cydoniae*, *Chrysomphalus scutiformis* and *Icerya purchasi* on bananas. From Panama Canal Zone, *Lepidosaphes beckii* on oranges; and *Parlatoria proteus* and *Lepidosaphes crotonis* on croton plants. From Panama, *L. beckii* on oranges. From Brazil, *L. beckii* on oranges. From Hawaii, *Diaspis bromeliae* and *Pseudococcus bromeliae* on pineapples; *Coccus elongatus*, *Saissetia nigra*, *Chrysomphalus* sp. and undetermined Aphids on betel leaves; larvae of *Dacus* (*Bactrocera*) *cucurbitae* in cucumbers; undetermined weevils in bean pods; *Pseudococcus nipae* and *Coccus elongatus* on dracaena; *Lepidosaphes auriculata*, *Parlatoria proteus* and *Pseudococcus* sp. on croton; *Ripersia palmarum*, *Hemichionaspis minor*, *Chrysomphalus aonidum*, *Aspidiotus lataniae*, *Diaspis boisduvali*, larvae of *Hyposmocoma* sp., *Prenolepis* sp., *Phenacaspis* sp. and *Chionaspis* (*P.*) *inday* on coconuts; *Saissetia nigra* and *Pseudococcus virgatus* on red berries; *Saissetia oleae* and *Pseudococcus longispinus* on oleander; *Phenacaspis* sp. and *Saissetia nigra* on *Hibiscus*; *Coccus mangiferae* and *Pseudococcus nipae* on *Caladium*; and *P. citri* and *Chrysomphalus aonidum* on limes. From Papeete, *Euscepes batatae* in sweet potatoes and yams; *Lepidosaphes beckii* on limes; and *Pseudococcus bromeliae* on pineapples. From Philippine Islands, *Parlatoria pergandei* on orange. From Tahiti, *Hemichionaspis* sp. on orchid. From Samoa, larvae of undetermined Lepidoptera in mango seeds. From Singapore, *Araecerus fasciculatus* in nutmegs. From Australia, undetermined Coccids on lemons. From Japan, *Plodia* sp. on peanut sacks; and undetermined weevils in chestnuts. From China, *Parlatoria pergandei* and *Lepidosaphes beckii* on pomelo; and undetermined weevils in sweet potatoes, albizzia seed and beans. From Italy, larvae of *Balaninus* sp. in chestnuts; larvae of *Volucella obesa* in cucumbers; and *Lepidosaphes beckii* and *Aspidiotus hederae* on lemons. From Holland, *Merodon equestris* in bulbs. From Spain, undetermined Lepidopterous larvae in shelled almonds.

Experiments on Red Ring Disease of the Coconut in Grenada.—*Agric. News, Barbados*, xxi, no. 519, 18th March 1922, p. 94.

Experiments with salt as a preventive of red ring disease of coconuts [*R.A.E.*, A, x, 107] have been continued. Salt tied up in gunny sacking was fixed to the highest part of the crown of various trees, so that the drip could soak down to the bases of the expanding and expanded leaves. The trees were then inoculated in July with fragments of infested material. When examined before the end of November, all showed evidence of Nematode infestation, showing that the treatment had been ineffective in preventing or even appreciably delaying infection. Another set of eight trees was treated by the soil only being inoculated with salt, but this also failed to afford protection. Eight trees banded with a mixture of two parts tar to one part tallow at

intervals from 30th June to 16th September, the surrounding soil being inoculated with diseased material, showed external symptoms of disease at the end of November.

PICARD (F.). **Contribution à l'Etude des Parasites de** *Pieris brassicae*, **L.**—*Bull. Biol. de la France et de la Belgique, Paris*, lvi, pt. 1, 15th April 1922, pp. 54-130.

This paper is divided into three parts, the first dealing with the parasites and hyperparasites of the larvae of *Pieris brassicae*, L., comprising *Apanteles glomeratus*, L., with its parasites *Tetrastichus rapo*, Wlk., *Dibrachys boucheanus*, Ratz., *Eutelus mediterraneus*, Mayr, *Habrocytus* sp., and *Hemiteles* sp.; *Anilastus ebeninus*, Grav., and its parasite *Angitia* sp. ?; and *Compsilura concinnata*, Meig.

The second part is devoted to the parasites of the pupal stage, *Pteromalus puparum*, L., *Dibrachys* sp., and *Pimpla instigator*, F.; and the third considers the relations between parasite and host, and among the parasites themselves, hyperparasitism, nutrition, reproduction, adaptation, etc.

LEEFMANS (S.). **Bijdrage tot het Vraagstuk der Blad-rollers van de Thee.** [A Contribution to the Question of the Leaf-rollers of Tea.]—*Meded. Proefst. Thee, Buitenzorg*, no. 77, 1921, 83 pp., 20 plates. (With a Summary in English.)

This paper has already been noticed from another source [*R.A.E.*, A, x, 281].

KESHKOVSKY (F. V.). **Результаты Опытовъ по Воздѣлыванію Кукурузы на Зерно. (Изъ Отчета Полеводственнаго Отдѣла за 1914 годъ.)** [Experiments with the Cultivation of Maize. (From the Report of the Agricultural Department for 1914.)]—**Ростово-Нахичеванская на Дону районная Сельско-Хозяйственная Опытная Станція** [*Rostov-Nakhitchevan on the Don Div. Agric. Expt. Sta.*], *Rostov-on-Don*, 1918, pp. 1-40, 4 figs. [Received 8th May 1922.]

In the course of experiments on the cultivation of maize it was found that all varieties tested were equally attacked by *Pyrausta nubilalis*, Hb. (*Botys silacealis*), and the degree of infestation did not vary in either closely or thinly sown rows.

Review of Agricultural Operations in India, 1920-21.—*Calcutta*, 1922, pp. 35-38. [Received 8th May 1922.]

Most of the work dealing with insect pests and useful insects here recorded has already been noticed [*R.A.E.*, A. x, 150-160, etc.].

PILLAI (N. K.). **Entomology.**—*Rept. Dept. Agric. & Fisheries, Travancore, 1920-21, Trivandrum*, 1922, p. 3. [Received 8th May 1922.]

Spodoptera mauritia (rice swarming caterpillar) and *Leptocorisa varicornis* (rice bug) did considerable damage to the rice crop, but were checked by the remedies previously used [*R.A.E.*, A, ix, 319]. The most important coconut pest was *Nephantis serinopa* (coconut palm leaf-roller); 65,000 coconut palms were treated by cutting off

and burning infested leaves [*loc. cit.*]. The ginger crop was attacked by two Dipterous borers, one being *Calobata* sp. and the other an unidentified fly. Termites on sugar-cane were successfully treated with one part crude oil emulsion to forty parts of water.

SUBRAMANIA IYER (T. V.). **Notes on the more Important Insect Pests of Crops in the Mysore State. ii. Lepidoptera (cont.).**—*Jl. Mysore Agric. & Exptl. Union, Bangalore,* iii, no. 4, December 1921, pp. 189–194. [Received 9th May 1922.]

These notes are continued from a previous paper [*R.A.E.*, A, x, 200]. *Phthorimaea operculella*, Z. (potato caterpillar) is an occasional pest of both growing and stored potatoes, and is commonly found in July and October. Seed potatoes should be stored under dry sand, and should be frequently examined and rotten ones destroyed. Care should be taken to plant only healthy seed. *Nymphula depunctalis*, Gn., is an occasional pest of rice in September and October, the caterpillars eating the epidermis of the leaves. The remedy is to pour a thin film of kerosene on the surface of the water standing in the paddy fields, and then draw a rope across the crop so that the caterpillars drop on to the kerosene and die. *Schoenobius incertellus*, Wlk. (*bipunctifer*, Wlk.) (paddy stem borer) is sometimes a serious rice pest in September–October, the caterpillars boring into the main stem, where they develop, the central shoots withering or failing to develop ears in the case of older plants. Ploughing after harvest destroys many larvae and pupae in the stubble. Light traps might attract the moths, which are on the wing from August to November. *Anomis* (*Cosmophila*) *erosa*, Hb. (cotton semi-looper caterpillar) and *Sylepta derogata*, F. (cotton leaf-roller) are minor pests of cotton; hand-picking the larvae of the former is suggested, and wagtails often destroy many of them. The latter moth only attacks introduced cottons, and early removal of affected leaves is recommended. *Spodoptera mauritia*, Boisd., is sometimes a serious pest of rice nurseries; when plenty of water is allowed in the nursery bed and the seedlings are transplanted early, adjoining seed-beds are not attacked. The Pyralid, *Saluria inficita*, Wlk., is a specific pest of ragi plants in the Madras Presidency. In Mysore, where much ragi [*Eleusine coracana*] is grown, it has not attacked this crop but has appeared on dryland rice; much damage will be done if it begins to attack ragi. Flooding the infested fields for a few hours cleared them of infestation. *Stenachroia elongella*, Hmp., occasionally causes much loss by webbing up the grains and living in the earheads of cholam (*Andropogon sorghum*), being generally found in August. The first earheads attacked should be destroyed; if infestation is found about harvest-time, the grain should be threshed immediately after harvest. *Virachola isocrates*, F. (pomegranate fruit borer) is generally found in March and April, when the larvae bore into the developing fruits and consume the seeds. Guava, orange and tamarind are also attacked in other parts of India. While still small, many of the fruits can be saved by rubbing off the eggs of this butterfly. Each fruit should then be tied up in a piece of cloth.

Sugar-cane borers include *Scirpophaga xanthogastrella* (*auriflua*), which is a serious pest in all sugar-cane districts in the State. The moths are on the wing generally from February to April and September to November. Egg-masses are laid on the cane leaves and the larvae, which hatch in about five to seven days, enter the stem, causing the top shoots to wither and die. In the case of older canes, growth is

stopped, side-shoots are thrown out and a bunchy top is formed. The larvae pupate inside the tunnels. Collection of the egg-masses is advised, and these should be kept to allow the Chalcid parasites to escape. Plants showing dead-heart and wilting top-shoots should be cut out and destroyed with the larvae within them. As the moths breed freely in a species of *Cyperus* that grows wherever sugar-cane is grown under tanks, it should be destroyed if possible. *Sesamia inferens*, Wlk., causes rather similar damage in sugar-canes and less frequently in cholam and wheat. The remedy is to cut out the plants showing dead and wilting central shoots and destroy them. A Tachinid parasite reduces the numbers considerably. *Diatraea* spp. attack the canes in a similar manner and require the same treatment.

WATSON (J. R.). **Control of Root-knot, II.**—*Florida Agric. Expt. Sta., Gainesville,* Bull. 159, April 1921, 16 pp. [Received 9th May 1922.]

Root-knot is one of the most widespread and destructive diseases of vegetable crops in Florida, its cause being the Nematode, *Heterodera radicicola*, which bores into the roots and feeds upon the sap. A list of forty-three common food-plants grown in Florida is given. Grasses are practically resistant, and trees and shrubs are not much attacked, but almost all vegetable and garden crops are more or less susceptible. It is impossible to grow profitably such susceptible crops as okra [*Hibiscus esculentus*], tomatos, eggplants, etc. on infested land. The Nematodes are least active during the cool, dry weather from about November to April, and are most destructive during the summer; plants such as celery and early lettuce, planted in autumn or late summer, are generally severely damaged.

For those who farm on a large scale, the cheapest method of treating infested land is to grow immune or resistant crops for three years. For smaller areas, where this is not possible, the numbers of Nematodes can be reduced by growing during the summer resistant or immune cover crops in rows that can be constantly cultivated, by summer fallowing, by applying one ton per acre of fresh cyanamide a month or two before planting, or by flooding the land for a week or two. Seed-beds should be planted on newly cleared land or the land should be treated with sodium cyanide, 600–800 lb., and ammonium sulphate, 900–1,200 lb. per acre; this is too expensive for large areas. In small home gardens fallowing should be practised and chickens should be turned loose. Perennial plants should be planted on newly cleared land and should be mulched and watered well but not cultivated. Figs should be planted near a building, and peaches should be grafted on plum roots. All dirt should be cleaned from ploughs and other implements before taking them into a field free from Nematodes, and water should not be allowed to flow from an infested into a clean field.

BLACKMAN (M. W.). **North American Ipidae of the Subfamily Micracinae, with Descriptions of New Species and Genera.**—*Mississippi Agric. Expt. Sta., Agric. Coll., Miss.,* Tech. Bull. 9, December 1920, 62 pp., 5 plates. [Received 9th May 1922.]

This paper forms a contribution towards a revision of the North American SCOLYTIDAE, based largely upon studies and collections

made in the field in the winter and spring of 1919–20. Comparative notes are given on the genera of the subfamily MICRACINAE, and keys are given to these genera, and also to the North American species of *Micracis*, *Thysanoes*, and *Pseudothysanoes*, gen. n. Revised descriptions and comparative notes are given of the genera dealt with, and the new subgenera *Micracisoides* and *Pseudomicracis* are erected.

The new species described are *Micracis biorbis*, from hickory; *M. bicornus* and *M. harnedi*, from dead hickory; *M. langstoni*, from the wood of honey locust, hackberry, slippery elm and mulberry; *M. meridianus*, from the wood of red-bud; *M. populi*, which is described by J. M. Swaine, in shoots of poplar; *M. swainei*, from dead willow; *Thysanoes lobdelli*, from oak and maple; *T. berschemiae*, from the wood of *Berschemia scandens*; *Pseudothysanoes drakei*, gen. et sp. n., from bark of basswood; *P. lecontei*, from oak twigs; *Cryptocleptes dislocatus*, gen. et sp. n., from hickory bark and limbs and twigs of pecan; and *Erineosinus squamosus*, gen. et sp. n., from the inner bark of osage orange (*Maclura pomifera*).

BLACKMAN (M. W.). **Descriptions of Eight new Bark Beetles (Ipidae) from Mississippi.**—*Mississippi Agric. Expt. Sta., Agric. Coll., Miss.*, Tech. Bull. 10, May 1921, 16 pp., 2 plates. [Received 9th May 1922.]

The new species described are:—*Phthorophloeus dentifrons*, in dead limbs and twigs of hackberry (*Celtis mississippiensis*); *P. mississippiensis*, from the bark of dying wild plum (*Prunus angustifolia*); *Phloeosinus enixus*, from the bark of *Juniperus virginiana*; *Pseudopityophthorus gracilis*, from the bark of dead limbs of water oak (*Quercus nigra*) and of *Quercus* sp.; *Pityophthorus scriptor*, from the bark of sumac (*Rhus hirta*); *P. natalis*, from beneath the bark of dead limbs of red-bud (*Cercis canadensis*); *P. liquidambarus*, from beneath the bark of limbs of sweet gum (*Liquidambar styraciflua*); and *Pityogenes meridianus* from burrows in loblolly pine (*Pinus taeda*) and shortleaf pine (*P. echinata*).

LLOYD (Ll.). **Red Spiders on Cucumbers and Tomatoes.**—*7th Ann. Rept. 1921, Exptl. & Res. Sta., Cheshunt, Herts*, 1922, pp. 41–52. [Received 9th May 1922.]

A detailed account is given of the life-history and habits of the red spider, *Tetranychus telarius*, as affecting cucumbers and tomatos grown under glass in England. The remedial measures suggested include cutting out cucumber plants in the middle of the season when their vigour has gone and planting tomatos in their place; the mites frequently die off on the tomatos in these circumstances. A great deal can be done to prevent attack by keeping down weeds on the nursery and in the neighbouring hedges; *Convolvulus* in particular is a preferred plant. Plant pots should be dipped for a moment into boiling water before being used. Large numbers of the mites can be destroyed by pinching out with the fingers the affected parts as they appear on the foliage. The sprays that are recommended against the mites both on the plants and in the greenhouse have already been described [*R.A.E.*, A, ix, 321, 528].

LAWSON (P. B.). **The Cicadellidae of Kansas.**—*Kansas Univ. Sci. Bull., Lawrence*, xii, no. 1, 15th March 1920, 306 pp., 17 plates. [Received 9th May 1922.]

This systematic treatise on the CICADELLIDAE of Kansas aims at providing something more than a mere State list, of which five have already been published, and offers much material for study of the native forms. Keys are included for the separation of all the groups down to species, with descriptions of all species known to occur in the State, and food-plant and locality records have been added wherever possible. Brief notes on the economic importance of the family are given. No attempt has been made to give a detailed description of the morphology, but an original study of the internal male genitalia is included.

GAHAN (A. B.). U.S. Bur. Ent. **A New Hymenopterous Parasite upon Adult Beetles.**—*Ohio Jl. Sci., Columbus*, xxii, no. 5, March 1922, pp. 140–142.

The Braconid, *Syrrhizus diabroticae*, sp. n., is described from Ohio, where it is parasitic upon *Diabrotica vittata* (cucumber beetle) to the extent of about 1 or 2 per cent. in the summer, and somewhat more commonly in May and June. The egg of the parasite is deposited in the thorax of the host, apparently through one of the sutures near the base of the elytra. The larva feeds internally and when mature escapes from the body of the host, which is killed, though not outwardly defaced. The parasite pupates just below the surface of the soil in a closely woven silken cocoon, pupation lasting about ten days.

The species does not fully agree with the characterisation of the genus *Syrrhizus*, Först., but considering the evident intergradation of the differentiating characters, it seems more reasonable to place it in this genus than to erect a new one for it at the present time.

PARROTT (P. J.). **Control of Sucking Insects by Dusting.**—*New York State Fruit Grower, Albion*, vi, no. 3, March 1922, pp. 10, 11, 14, 17, 18.

This article has already been noticed from another source [*R.A.E.*, A, x, 325].

PARROTT (P. J.), GLASGOW (H.) & MACLEOD (G. F.). **Control of Apple Red Bugs by Dusting.**—*New York Agric. Expt. Sta., Geneva*, Bull. 490, November 1921, 30 pp., 5 plates. [Received 9th May 1922.]

Apples in New York State are severely damaged by the attacks of the plant bugs, *Lygidea mendax*, Reut., and *Heterocordylus malinus*, Reut., which cause knotty, deformed apples and premature dropping of young fruits.

The remedy for this form of injury has generally been spraying mixtures containing nicotine sulphate. Dusting preparations containing 0·25, 0·50, 1·0 and 2·0 per cent. of nicotine were toxic to the bugs [*cf. R.A.E.*, A, x, 305]. Spraying mixtures at standard strengths also gave good results. Nicotine sulphate at the strength of ¼ or ½ pint to 100 gals. of either soap or lime-sulphur solution showed considerable toxicity. Larger amounts of nicotine, either in dust or spray, gave on an average more uniform results and displayed higher killing power. The cost for both spraying and dusting is variable, depending on labour,

machinery, size of tree, weather conditions, kind and cost of insecticides, etc. Nymphs and adults of both species seemed about equally susceptible to either dusting or spraying mixtures. The two essential factors for successful treatment are materials with adequate insecticidal properties and contact of the material with the insects.

Temperatures ranging from 44 to 87° F. and moisture on foliage apparently had no influence on the toxic properties of dusting mixtures. The dosage cost for dusting is higher than for spraying, owing chiefly to the high nicotine content of the dust mixtures. Dusting, however, is economical in time and labour. For the average grower, and with the prevailing prices of material and labour, the apple red-bugs can be more efficiently and economically dealt with by spraying than by dusting. In large commercial orchards dusting is of great advantage as a supplement to the usual spraying operations. Derris and tobacco dust, either alone or with soap or lime-sulphur solution, showed a high degree of toxicity. There is great need for discovery of effective and less expensive dusting materials as contact insecticides for these bugs.

A shorter account of these dusting experiments and the results obtained, written by J. D. Luckett, is given in a popular edition of this bulletin.

Comstock (J. A.). **A Giant Palm-boring Beetle**—*Dinapate wrightii.*—*Bull. Southern Calif. Acad. Sci., Los Angeles,* xxi, pt. 1, March 1922, pp. 5–17, 2 plates.

The main points of interest in connection with *Dinapate wrightii*, Horn, are given, the information being taken from various technical and general papers.

So far as known, this Bostrychid occurs only in the canyons debouching into the Coachella valley, California, where the palm, *Neowashingtonia filifera*, grows.

Ruby (J.). **La Lutte contre les Sauterelles dans les Bouches-du-Rhône.**—*Vie Agric. et Rur., Paris,* xx, no. 17, 29th April 1922, p. 292.

The methods used in the recent campaigns against locusts in the Bouches-du-Rhône district are described [*R.A.E.*, A, x, 23, etc.].

La Pirala o Gusano de las Manzanas (*Carpocapsa pomonella*).—*Gaceta Rural, Buenos Aires,* xv, no. 176, March 1922, pp. 919–923, 6 figs.

The life-history and habits of *Cydia* (*Carpocapsa*) *pomonella*, L., as occurring on apples are described, and the usual arsenical sprays are suggested as remedies.

Diffloth (P.). **Les Ennemis de la Vigne.**—*Vie Agric. et Rur., Paris,* xx, no. 18, 6th May 1922, pp. 315–319, 5 figs.

This paper summarises information from various sources regarding the commoner insect pests of the vine.

Génieys (P.). **Observations biologiques sur les Habrobracons.**—*C.R. Soc. Biol., Paris,* lxxxvi, no. 15, 29th April 1922, pp. 829–831.

The author records further observations following upon the discoveries of Trouvelot regarding the feeding habit of *Habrobracon*

johansenni, Vier., on *Phthorimaea operculella*, Z. [*R.A.E.*, A, x, 86]. The method of parasitism and feeding by *H. brevicornis*, Wesm., on its host, *Pyrausta nubilalis*, Hb., is described in detail, and differs little from that referred to above, except that the construction of a suction tube has never been observed, the parasite apparently absorbing directly the body juices of the host. Experiments were then made with adults of *H. johansenni*, provided with larvae of *P. operculella* and also those of an unidentified Microlepidopteron living on *Lavandula stoechas*. In each case the larvae were either used before spinning their cocoon or else were removed from the cocoon, and in no case was the construction of a connecting tube attempted; the parasite fed directly on the body of the host. The construction of the tube is therefore connected with the presence of a cocoon around the larva, but whether there is a change of instinct in the absence of the cocoon, or whether the tube is omitted for merely mechanical reasons, is not clear.

MASON (A. C.). **Life-history Studies of some Florida Aphids.**—*Florida Ent., Gainesville*, v, no. 4, April 1922, pp. 53–59, 62–65.

Recent experimental work tends to show that true sexual forms in Aphids are produced only when conditions are not favourable to a continuance of adult life. Attempts have therefore been made with several species to continue rearing throughout the winter in order to determine whether any sexual forms occur. *Myzus persicae*, Sulz., is a very common and destructive species in Florida, being found at all seasons of the year except the summer months. It feeds on practically any young tender plant growth until about June, and later disappears entirely, though small numbers probably continue to live unnoticed on wild plants. An attempt to rear this species in jars in a greenhouse had to be abandoned late in April owing to fungous disease and extreme heat causing the Aphids to die off, but during the winter no tendency to oviparous reproduction was seen. Both winged and apterous females continued to breed parthenogenetically throughout the winter, the average age of the female when the first young were produced being 11 days, number of offspring being 27, and average length of life 17 days. This would allow nearly three generations a month as the maximum rate of reproduction. During the next winter, breeding was carried on in the open-air insectary. In these conditions reproduction began at the age of 15 days on the average, so that two generations a month would be the maximum number. The average length of the whole life was about 36 days, the productive period being 18 days and the approximate number of young 43. No males or sexual eggs ever appeared. The fungus, *Entomophthora aphidis*, probably accounts largely for the apparent disappearance of the Aphids during the summer, and seems to be peculiar to this species. The Hymenopterous parasite, *Diaeretus rapae*, Curt., two species of Syrphids, the lacewing, *Chrysopa oculata*, Say, and the Coccinellid, *Chilocorus bivulnerus*, Muls., all destroy numbers of them.

Aphis gossypii, Glov. (melon aphis) is of great economic importance in Florida and is very numerous, occurring in various forms on different food-plants, of which about thirty are known in Florida. The Aphids live on melons and other fresh plants during the spring and summer, and then migrate to orange trees in the autumn, any interval after the melon vines have disappeared being spent on wild plants. It is

possible that winter eggs are laid on the orange trees in the northern and cooler parts; this may account for their not being found in the open on oranges except during part of the winter. No sexual forms or eggs were ever seen, however, and they probably do not occur, at least in ordinary seasons. Enemies include the parasite, *Diaeretus rapae*, the lacewings, *Chrysopa oculata* and *Hemerobius* sp., and several Coccinellids and Syrphids.

Lachnus pini, L., although not important economically, was studied during experimental work, and its life-history has been worked out. This Aphid lives on pine-trees throughout the winter, reproducing viviparously. The Hymenoptera, *Aphidius bifasciatus*, Ashm., and *A. pinaphidis*, Ashm., are internal parasites. *L. pini* is remarkably protected by ants, which build a covering over the colonies of Aphids and drive off their enemies.

WATSON (J. R.). **New Thysanoptera from Florida. ix.**—*Florida Ent., Gainesville*, v, no. 4, April 1922, pp. 65–66.

Hindsiana pini, sp. n., is described from a single female taken from a young long-leaved pine-tree.

WATSON (J. R.). **Another New Thrips from Cocoanuts from Cuba.**—*Florida Ent., Gainesville*, v, no. 4, April 1922, pp. 66–67.

Hindsiana cocois, sp. n., is described from females and larvae taken under scale-caps of coconuts from Cuba, intercepted in quarantine.

WARBURTON (C.). **Annual Report for 1921 of the Zoologist.**—*Jl. R. Agric. Soc. England, London*, lxxxii, 1921, pp. 270–275. [Received 11th May 1922.]

The unusual weather conditions of 1921 resulted in an early appearance of spring pests and the continuation of insect damage to a remarkably late date. Cereals suffered in the spring from wireworms and leather-jackets [*Tipula*]; frit-fly [*Oscinella frit*] was locally very destructive to late-sown oats; gout-fly [*Chlorops taeniopus*] occurred widely in barley; wheat bulb-fly [*Hylemyia coarctata*] only caused serious damage in a few places. The life-history studies on this pest [*R.A.E.*, A, ix, 487] are now complete. The flies begin to appear in early June, though emergence may be delayed until July. Oviposition occurs in bare soil at a depth of about $\frac{1}{8}$ in. during July and August. A few eggs hatch in the autumn, but most remain until the following spring, when the newly hatched larvae penetrate the central shoots of wheat plants and finally kill them. A single maggot may attack several wheat plants in succession. Damage is not very apparent until the third larval stage is reached, in April, when the crops suffer visibly. When fully fed, in May, the maggots leave the wheat and pupate in the soil at a depth of $1\frac{1}{2}$–2 in. There is thus only one generation in a year. The habit of oviposition on bare ground explains why bad attacks of *H. coarctata* always follow a bare fallow.

Many apple pests were reported. Winter moth [*Chematobia brumata*], apple-sucker [*Psylla mali*] and apple-blossom weevil [*Anthonomus pomorum*] all appeared at an early date; the two latter were very troublesome; the place of *C. brumata* in Kent orchards seems to be increasingly taken by the small case-bearer, *Coleophora nigricella*, against which winter washes are useless, but nicotine washes at the

time of attack are highly effective. Leaf blister mites were very injurious, and in addition to *Eriophyes pyri* on apple, *E. malinus* has been found for the first time in England on apple leaves ; it causes a rosy-pink velvety growth on the leaves, which later turn brown and die. A species of *Phyllocoptes* was found on an apple twig from Bristol ; this may be *P. schlechtendali*, known to infest apple trees in Central Europe. Gooseberries were damaged by sawflies and red spider [*Tetranychus* spp.] ; raspberries by the raspberry beetle [*Byturus tomentosus*] and bud-moth [*Incurvaria rubiella*]. No successful remedy for big-bud in black currants has been found ; an effective method of obtaining mite-free plants from infested bushes has already been noticed [*R.A.E.*, A, ix, 486].

Root crops suffered from the turnip flea-beetle [*Phyllotreta nemorum*] and from surface caterpillars ; poison bait is not a popular remedy in England ; poultry on the field during cultivation destroy thousands of the caterpillars. Cabbages and turnips were injured by gall-weevil [*Ceuthorrhynchus pleurostigma*] and by Aphids. *Aleurodes* spp. were remarkably abundant on all plants of the cabbage tribe, the commonest species being *Aleurodes brassicae* and *Aleurochiton vaporariorum*, the latter chiefly on tomatos under glass. The hot-house species can be dealt with by fumigation, but on cabbages little can be done beyond stripping off and burning diseased leaves.

Forest pests were not abundant, except Aphids, including *Lachnus viminalis* on willow.

The nature of Isle of Wight disease in bees is discussed, and the importance of further research to elucidate points that are by no means clear is pointed out.

SEVERIN (H. C.). **Twelfth Annual Report of the State Entomologist of South Dakota for the Period ending 30th June 1921.**—*Brookings, S.D.* [n.d.], 29 pp., 2 figs. [Received 11th May 1922.]

A list is given of the more harmful insect pests found in the nurseries of South Dakota, arranged according to the plant attacked. The information concerning *Neurotoma inconspicua*, Norton, has already been noticed [*R.A.E.*, A, ix, 236]. During investigations on *Gryllus assimilis*, F. (common field-cricket) the following natural enemies were found :—*Ceratoteleia marlatti*, Ashm., *Paridris brevipennis*, Fouts, and *Exoristoides johnsoni*, Coq., parasitising the eggs ; *Euthrombidium* sp., Gamasids and *Paragordius varius*, Leidy, parasitic on the adults, the latter also occurring in the nymphs ; and *Chlorion cyaneum*, Dahl., and spiders predacious on the nymphs and adults. The work in connection with *Meromyza americana*, Fitch (wheat-stem maggot) has been continued, and in addition to the natural enemies already mentioned [*R.A.E.*, A, ix, 237] *Trombidium* sp. ? is recorded as feeding on the larvae ; several food-plants have been added to the existing list. Preliminary lists of the Cicadids, Membracids and Cicadellids occurring in South Dakota are given.

PAINE (S. G.) & LACEY (M. S.). **Chocolate Spot Disease or Streak Disease of Broad Beans.**—*Jl. Minist. Agric., London*, xxix, no. 2, May 1922, pp. 175–177, 1 plate.

It is only under exceptional weather conditions that chocolate spot or streak disease of broad beans assumes the form of an epidemic as was the case in 1920 throughout England and Wales. The organism

causing the disease is *Bacillus lathyri*, which also causes streak in sweet peas and stripe in tomatos. The organism probably gains entry into the leaf through the stomata, and the apparent spread of the disease eastwards would suggest dispersal by wind. It is also carried in the seed of winter beans, especially those injured by *Bruchus rufimanus*. It is possible that the plant may be inoculated at the time of oviposition, and the young larvae developing in the pod may infect the seeds as they bore into them.

CORKINS (C. L.). **Notes on the Migration of** *Melanoplus atlantis*, **Riley, in northern North Dakota in 1920. Observations in Bottineau and Renville Counties.**—*Canadian Ent., Orillia*, liv, no. 1, January 1922, pp. 1–4.

The effect of the intensive grasshopper campaign carried out in 1920, in Renville County, North Dakota, was adversely influenced by the migration of *Melanoplus atlantis*, Riley, from untreated areas. The habits of flight observed during this extensive migration were unlike those usually attributed to this species, resembling rather those of *M. spretus*, Uhl. A swarm would frequently settle in a wheat field and leave the next day, although there was an abundance of palatable food. In August the altitude of flight was taken in an aeroplane, and the swarm was found to be densest at 500 to 800 feet, a few individuals being found at 1,650 feet above ground. The speed of flight was determined by means of a motor car to be 20 miles an hour.

Douglas Fir Seed Fly (*Megastigmus spermotrophus*, **Wachtl**).—*Forestry Commiss., London*, Leaflet no. 8, October 1921, 3 pp. [Received 13th May 1922.]

A large proportion of seed of the Douglas fir [*Pseudotsuga taxifolia*] is rendered useless by the attack of the Chalcid, *Megastigmus spermotrophus*. Eggs are laid in fertilised flowers or young cones in May or June; the larvae feed on the contents of the seed during the summer and remain in it during the winter. Pupation occurs in March and April, and the adults are found from April to June. Occasionally the larvae may spend two winters in the seed. The presence of the larvae can only be detected by cutting the seed open. The only remedial measure that can be suggested at present is fumigation with carbon bisulphide at the rate of one ounce to every 100 lb. of seed or to every cubic foot of space. All light seed discarded in winnowing and cleaning should be swept up and burnt.

PETCH (T.). **The Diseases and Pests of the Rubber Tree.**—*London*, Macmillan & Co., Ltd., 1921, x + 278 pp., 6 plates, 38 figs. Price 20*s*.

One chapter of this book is devoted to the animal pests of rubber occurring chiefly in Ceylon and the East Indies. The noxious insects include the Longicorn, *Batocera rubus*, the Scolytids, *Xyleborus perforans* and *X. parvulus*, the locust, *Cyrtacanthacris nigricornis*, and *Coptotermes* (*Termes*) *gestroi*. Up to the present, insect pests of *Hevea*, with the exception of the last named, have proved of minor importance in comparison with fungous diseases.

BEESON (C. F. C.). **Forest Entomology.**—*Reprint from Ann. Rept. Bd. Scientific Advice for India, 1920–21* [*Calcutta*], 1922, 2 pp.

In the course of further work on the occurrence of the Longicorn, *Hoplocerambyx spinicornis*, in the sal [*Shorea robusta*] forests of Dehra Dun, particular attention was paid both in the insectary and in the field to the effects of soil and rainfall conditions on the incidence of the borer. It is now known that in a series of years of high rainfall, the increase of the borer is encouraged and the resistance of the plant is lowered, while in years of low rainfall the reverse occurs. If the monsoon fails during a borer epidemic, the proportion of trees fatally attacked is reduced (in spite of the relatively increased incidence of the borer) to such an extent that the pest receives a marked check. Remedial measures have been based upon these facts and are being tested. During survey tours it was discovered that *Hoplocerambyx* is rare or absent in the dry and hill type of sal forests, and that in the moist and valley type of sal its presence is usually secondary to attack by *Polyporus shoreae*. The frequent mortality of sal where borers are absent indicates that these insects are essentially secondary factors that under epidemic conditions may cause the death of weakened trees.

Studies have been made of the development and economic importance of *Aeolesthes holosericea*, *Xylotrechus smei*, *Platypus* spp., *Diapus* spp. and *Xyleborus* spp., and of the effect on their prevalence of climber-cuttings and of girdling and felling without removal of inferior species. *Calandra shoreae* (seed weevil) is found to have many dipterocarp food-plants.

Protection des Plantations de Caféiers contre le Scolyte du Grain de Café (*Stephanoderes hampei*).—*Agronomie Colon., Paris*, vi, no. 52, April 1922, pp. 117–118.

This decree has been already noticed from another source [*R.A.E.*, A, x, 228].

GRANDI (G.). **Agaonini e Sycophagini della Malesia e del Giappone. (Hymenoptera—Chalcididae.)** [Agaoninae and Sycophaginae of the Malay Archipelago and Japan.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric., Portici*, xv, 5th April 1922, pp. 205–222, 7 figs.

A description is given of *Blastophaga nipponica*, from *Ficus erecta* in Japan; *B.* (*Waterstoniella*) *masii* and *B.* (*W.*) *modiglianii*, from the island of Engano; and *Lipothymus sumatranus*, from Sumatra. A key is given to the above species of the subgenus *Waterstoniella*, and to *B.* (*W.*) *jacobsoni*, Grnd.

GRANDI (G.). **Ricostruzione e Morfologia comparata dei Generi** *Otitesella*, **Westw.,** *Sycobiella*, **Westw., ed affini. (Hymenoptera—Chalcididae.)** [The Reconstruction and comparative Morphology of the Genera *Otitesella*, *Sycobiella* and allied Genera.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric., Portici*, xvi, 15th April 1922, pp. 3–58, 21 figs.

This paper describes the following species of a group of Chalcids that the author is inclined to regard as parasitic rather than phytophagous:—*Otitesella digitata*, Westw., *O. epicarioides*, Grnd., *O. africana*,

Grnd., *Sycobiella monstruosa*, Grnd., *Terastiozoon jacobsoni*, Grnd., and *Micrognathophora leptoptera*, Grnd. Separate keys are given to the sexes of the above genera and to the sexes of the species of *Otitesella*.

GRANDI (G.). **Intorno al Ciclo biologico dell' *Aploneura lentisci*, Pass. (Hemiptera—Homoptera—Aphidoidea.) Nota preventiva.** [On the Biological Cycle of *A. lentisci*. Preliminary Note.]—*Rend. R. Accad. Naz. Lincei, Rome,* Classe sci. fis., mat. e nat., xxx, Ser. 5, Semestre 2, no. 3–4, August 1921, pp. 107–110.

Aploneura lentisci, Pass., which belongs to the subfamily ERIOSOMATINAE, has a gall-infesting generation on *Pistacia lentiscus* and a root-infesting generation on Graminaceae, such as *Dactylis glomerata* and *Anthoxanthum* sp. The following forms occur :—Apterous fundatrix; apterous gall-infestant ; alate migrant ; apterous root-infestant ; sexuparous alate "re-immigrant"; amphigonous male and female (sexuales). At Portici, the first larval fundatrices occur on the young leaves of *P. lentiscus* about the last ten days of April. Only the fundatrix occurred in galls throughout nearly the whole of May. Each fundatrix produces about 20 larvae, which become apterous gall-infestants. These produce 30–40 larvae, all of which, the author believes, become alate forms that migrate and begin the root-infestation on Graminaceae. By the end of August most of the galls contain the fundatrix, 15–20 apterous adults, and several hundred larvae, pre-nymphs and nymphs of the alate form. The latter migrate and deposit 6–8 larvae, which become apterous root-infestants (the "virginogenia" of Börner). The author's observations lead him to conclude that the root-infesting cycle comprises at least three generations. The first sexuparous alate "re-immigrants" appear in April, fly to *P. lentiscus*, and deposit amphigonous individuals.

At Portici the two most important enemies of this Aphid are the flies, *Pipizella heringi*, Zett., and *Leucopis palumbii*, Rond.

ZILLIG (—). **Schutzgerät beim Verstäuben giftiger Pflanzenschutzmittel.** [Protective Appliances for Use when Dusting with Poisons.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin,* ii, no. 4, 1st April 1922, pp. 25–26.

This article describes briefly various appliances of German manufacture for guarding the eyes and respiratory organs of operators using poisonous dusts in plant protection work.

GÖRNITZ (K.). **Seifen als Benetzungsmittel.** [Soaps as Wetting Agents in Sprays.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin,* ii, no. 4, 1st April 1922, pp. 26–27.

In the course of an examination of the alkaline soaps generally used to increase the wetting power of sprays, it was found that the common view that soft water is best for making soap solutions is incorrect. Soft water prevents the production of the lime soap, which dissolves badly in water and therefore results in flocculence and turbidity. In the tests it was found that in the weak solutions usual in practice the increase in wetting power is derived from the formation of this lime soap. By adding lime water to soap solutions (and thus increasing their lime soap content) an even more marked wetting power was attained. It is probable that this power is not due to the

flocculent lime soap itself, but to soluble traces of it (perhaps of a colloidal nature). Soap solutions to which lime has been added are more difficult to wash away, after drying, than those without lime.

Bekämpfung der Kartoffelnematode. [Measures against the Potato Nematode.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin*, ii, no. 4, 1st April 1922, pp. 30–31.

The government of Mecklenburg-Schwerin has issued an ordinance, dated 24th January 1922, placing all potato-growing areas under official supervision. All circumstances pointing to Nematode infestation must be reported to the local police. The export or sale of seed or potatoes from infested areas is forbidden, and the growing of potatoes is prohibited in such areas except by special permission.

HENNEMANN (W.). **Vögel als Blutlausvertilger.** [Birds as Destroyers of the Woolly Aphis.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin*, ii, no. 5, 1st May 1922, pp. 34–35.

In recent years the woolly aphis [*Eriosoma lanigerum*] has increased in the Lenne valley in Westphalia. Tits feed on this Aphid, but not sufficiently to be of any great assistance to apple growers.

ZIMMERMANN (H.). **Oelkäfer (*Meloë proscarabaeus*, L.) als Schädiger von Rotklee.** [*M. proscarabaeus* as a Pest of Red Clover.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin*, ii, no. 5, 1st May 1922, pp. 35–37.

Serious damage was done to fields of red clover in Mecklenburg-Schwerin in 1921 by a beetle, *Meloë proscarabaeus*, L. The beetles were first noticed on 27th April and began to decrease about 20th May. Individuals in captivity began ovipositing on 20th May. The eggs began to hatch on 25th June, and the larvae died in about ten days, after unsuccessful attempts to feed them had been made. This appears to be the first record of *M. proscarabaeus* injuring clover. The collection and destruction of the beetles seem to be the only measure possible.

MALENOTTI (E.). **Mezzi agrari di Difesa contro gli Insetti ed altri Animali dannosi in Agricoltura.** [Agrarian Means of Defence against Insects and other Animals harmful in Agriculture.]—Reprint from *L'Italia Agricola, Piacenza*, 15th July 1920, 11 pp. [Received 16th May 1922.]

Attention is drawn to the value against agricultural pests of agrarian measures, some of which are not actual cultural practices. They are enumerated, a few of the insects concerned in each case being mentioned.

MALENOTTI (E.). **Gli altri fanno, e noi . . . stiamo a vedere. (A Proposito della Mosca delle Olive.)** [Others act, and we . . . look on. A Note on the Olive Fly.]—Reprint from *Il Coltivatore, Casale Monferrato*, no. 33, 30th November 1921, 8 pp. [Received 16th May 1922.]

This is a plea for a campaign on a large scale in Italy against the olive fly [*Dacus oleae*] on the lines adopted in Greece [*R.A.E.*, A, x, 3]. The work in Greece is rendered possible by the fund raised by means of a special tax on olives and olive oil, by a state subsidy, and by the sale of material, apparatus, etc.

MALENOTTI (E.). **Venti Anni di Lotta contro la Mosca delle Olive in Italia.** [Twenty Years of Work against the Olive Fly in Italy.]—*Nuovi Ann. Minist. Agric., Rome,* i, no. 2, 31st December 1921, pp. 348-390. [Received 16th May 1922.]

This paper reviews the work done in Italy in combating *Dacus oleae*, Rossi, since 1901, chiefly along the lines of poisoning the fly or of importing its natural enemies. The various modifications undergone by the poison methods are traced down to the present time, when they have reached a stage of real practical value and only require co-operation in their application to ensure excellent results.

MALENOTTI (E.). **Sulla Biologia del *Dacus oleae* Rossi. (Alcune Osservazioni ed Esperienze eseguite in Maremma Toscana.)** [On the Biology of *D. oleae*. Some Observations and Experiments made in the Maremma District of Tuscany.]—Reprint from *Redia, Florence,* xv, 28th January 1922, 12 pp. [Received 16th May 1922.]

In October 1921 an outbreak of *Dacus oleae*, Rossi, occurred near Pisa, which was so severe as to result in an almost total destruction of the olive crop in that locality, with a loss of about £100,000 at par. The outbreak was favoured by abundant summer rains, which rapidly developed the fruits, and by the prolongation of the hot weather into October, which accelerated the development of the fly and the appearance of its second and third generations. The severity of the outbreak led to its rapid check, the adults of the third generation being about one-third smaller in size than the normal, because the larvae had to feed on fruits already damaged by the first two generations.

One experiment showed that though the larvae have no eyes they are markedly photophobic.

Some trees scattered among the others were covered with a sooty fungus (*Capnodium*) and were infested with a scale, *Saissetia oleae*, and ants, *Camponotus ligniperda* var. *pubescens*. The relation between the fungus and the scale was evident, while that existing between them and the trunk-infesting ants was established by destroying the nests of the latter, when they both disappeared. It is obvious that the ants protected the scales against predacious and parasitic enemies. This triangular relation was complicated by the presence of *D. oleae*, which infested these trees more than the others, not being attracted by the fruit, which was almost absent, but almost certainly by the sugary secretions of the scales. The latter were therefore responsible for the fungus and for a larger number of flies. Finally, the presence of the flies benefited the ants, which were several times seen capturing them and bearing them off to their nests. Several hundred flies a day must be accounted for by the workers from each nest, which is thus quite as much a focus of attraction and destruction as a poison-bait trap. An experiment once more confirmed the fact that dilute molasses is attractive to *D. oleae*, though the sooty fungus seemed to be still more attractive.

By 26th December no more adults were visible on the trees. Of 400 olives gathered on that day, 327 (81·7 per cent.) were infested. Of these, 282 (86·3 per cent.) were recent infestations, of which 64 (22·7 per cent.) were "healthy" infestations, while in the remaining 218 olives the infestation had been stopped by various causes, parasites

accounting for 67·8 per cent., or 52·4 per cent. of the 282 olives. Such a high percentage of parasitism is of less importance than is at first apparent, for it is due to the fact that by 26th December the number of olives—and in consequence the number of larvae exposed to parasitism—was small. The difficulty of ascertaining the number of fruits left on the trees in winter and the percentage of parasitism hinders an estimate of the infestation likely to occur in the following season. These factors may explain why a year of severe losses may be followed by a similar one.

MALENOTTI (E.). **Il Problema attuale della Mosca delle Olive in Maremma.** [The present Problem of the Olive Fly in the Maremma District of Tuscany.]—*Minist. Agric., Direzione Gen. Agric., Rome,* 1921, 20 pp. [Received 16th May 1922.]

In this address to agriculturists in the province of Pisa, it is pointed out that the molasses used to sweeten the poison spray against the olive fly [*Dacus oleae*] does not promote the development of the sooty fungus, *Capnodium oleae.* In advocating the formation of defence syndicates it is advised that these should be free, voluntary organisations unless at least one half of the olive trees in a given district belong to members, when defence measures can assume a compulsory character without leading to the complications bound to ensue if a minority seeks to use compulsion.

MALENOTTI (E.). **La Lotta contro le Cavallette nel Bacino del Fucino nel 1920.** [Anti-Locust Work in the Basin of the Fucino in 1920.] —*Nuovi Ann. Minist. Agric., Rome,* i, no. 1, June 1921, pp. 63–84, 1 map. [Received 16th May 1922.]

The infestation by *Calliptamus italicus* in the district of Fucino, which is the drained bed of a lake encircled by some of the mountains in the Abruzzi region, is of recent date, having first appeared in 1918. It is due to a local increase of this locust, favoured by the extension of bare, sunny stretches resulting from deforestation and of hard, unworked soil consequent on decreased cultivation after the earthquake of 1915. Furthermore, in 1919 and 1920 the weather was very dry in spring, which is the season in which this locust develops.

The swarms of *C. italicus,* consisted mainly of the form *marginellus,* Serv. Some specimens of *Oedipoda coerulescens* and *Tettigonia (Decticus) albifrons* were observed. In 1920 the first newly-hatched individuals were found in mid-May, the majority appearing at the end of May. In some places a second and distinct hatching was observed on 26th June, indicating a second oviposition. The first winged forms occurred on 21st June, and mating began on 12th July. Oviposition took place in August.

It is not feasible to draw up a simple list of preferred food-plants, as they vary according to the stage of development of the locust and the number of various plants available. For instance, nymphs having available cabbages, onions, tomatos, artichokes and peppers, preferred the last-named, though they had been sprayed with lime-sulphur, to the exclusion of the others. In another case, where peppers were lacking, artichokes were destroyed. It may, however, be said that in the Fucino district the preferred plants are such Leguminosae as lentils, vetches and clover, and then potatoes, maize and garden vegetables. A large number of wild grasses were also eaten. Bushes and

trees were attacked very exceptionally, and this applies to the grape vine, either in cultivation or allowed to run wild. Strangely enough such immunity extended to standing corn, though the chaff on threshing floors was eagerly sought for by the adults, which are also attracted to places where lentils, vetches, etc., are being threshed.

The lack of natural enemies was one reason for the outbreak. The beetle, *Mylabris* (*Zonabris*) *variabilis*, seems to be of little value, even if it were not so rare.

The government supplied insecticides and poisons for the campaign, which was carried out by land-owners and local authorities. Direct spraying of the locusts, the spraying of the grasses, and the use of poison-bran baits were resorted to. Lead arsenate, zinc phosphide, cresosol emulsion, and sodium arsenite were employed. Cresosol gave good results, but should only be used when sodium arsenite is not available; it scorches vegetation, injures rubber tubing, and costs more than the arsenite. Lead arsenite scorches vegetation if used in the large doses necessary to kill locusts, and is quite the most expensive poison in use. Sodium arsenite was the best material, and only half the quantity was needed as compared with zinc phosphide. If it becomes possible to reduce the phosphide to an exceedingly fine dust, it may compare with the arsenite, over which it has the advantage of not scorching. On the whole, the campaign was satisfactory, but the need for a regulation compelling careless land-owners to apply the measures was felt.

MALENOTTI (E.). **Le Cavallette** (*Calliptamus italicus*—**Grillastro italiano**). **Istruzioni pratiche per distruggerle mediante l'Arsenito di Sodio.** [Locusts (*C. italicus*). Practical Instructions for destroying them with Sodium Arsenite.]—*Minist. Agric. Direzione Gen. Agric., Verona*, November 1921, 4 pp. [Received 16th May 1922.]

The preparation and application of a solution containing 1·5–2 per cent, of sodium arsenite as a spray against locusts, *Calliptamus italicus*, are described. Many of the disadvantages attaching to this method disappear if a weaker solution (1 per cent.) is used to spray the herbage instead of the insects. Danger to cattle and all risk of scorching plants can be avoided by using a poison-bran bait containing from 3 to 4 per cent. of the poison according to the age of the locusts.

BERNARD (C.). **Verslag van het Algemeen Proefstation voor Thee over het Jaar 1921.** [Report of the General Tea Experiment Station for 1921.]—*Meded. Proefst. voor Thee, Buitenzorg*, no. 78, 1922, 32 pp. [Received 16th May 1922.]

Some of the matter contained in this report has already been noticed [*R.A.E.*, A, ix, 493; x, 175, 176, 281]. In Java, *Helopeltis* was the most serious pest of tea. *Brevipalpus obovatus* and *Tarsonemus translucens* occurred to some extent, while other mites noticed were *Tetranychus bioculatus*, *Eriophyes* (*Phytoptus*) *theae* and *E.* (*P.*) *carinatus*. These mites decreased at the beginning of the rainy season. *Tetranychus bimaculatus* occurred on cinchona. The caterpillars of *Setora nitens* and *Andraca bipunctata* (bunch caterpillar) caused some serious injury to tea. *Heliothrips haemorrhoidalis* badly damaged the leaves in some seed plots. Pests of little importance included the tea seed-bug (*Poecilocoris*), Coccids and Aphids.

In Sumatra both *Helopeltis* and *Pachypeltis* were energetically combated as soon as noticed so that little loss resulted. A twig-boring beetle, probably *Xyleborus fornicatus*, a Psychid, *Acanthopsyche* sp., a bunch caterpillar [*Andraca apodecta*, Swinh.], and *Stauropus alternus*, occurred here and there. Old nursery beds were attacked by *Megachile* sp., but no serious harm was done.

van Hall (C. J. J.). **Ziekten en Plagen der Cultuurgewassen in Nederlandsch-Indië in 1921.** [Diseases and Pests of Cultivated Plants in the Dutch East Indies in 1921.]—*Meded. Inst. Plantenziekten, Buitenzorg*, no. 53, 1922, 46 pp.

Coffee was subject to increased attacks by the berry borer, *Stephanoderes hampei*, Ferr. Scale-insects did no great damage, though *Coccus* (*Lecanium*) *viridis* (accompanied by a troublesome ant, *Oecophylla smaragdina*), *Pseudococcus virgatus* and *P. crotonis* (?) were not unimportant in some localities. *Xyleborus coffeae* and *Zeuzera coffeae* caused some losses ; in one district the former was checked by a Chalcid.

Forest pests included *Calotermes tectonae*, which did much injury to teak in Central Java, while a root-boring beetle, *Xyleborus* sp., severely attacked young mahogany. Young teak trees infested by white scales were bored by the larvae of *Dichocrocis punctiferalis*.

Potatoes suffered comparatively little from the attack of a Coccinellid, *Epilachna*, which had been very injurious previously, and the potato weevil, *Cylas formicarius* (*turcipennis*), also did little harm.

Cassava was infested by mites as usual ; the losses due to *Tetranychus bimaculatus* were, however, unimportant.

Kedelé [*Glycine soja*] was attacked chiefly by the pod borer, *Etiella zinckenella*, while the stem borer, *Agromyza sojae*, caused loss in one district. Chrysomelid beetles and Sphingid and Noctuid caterpillars also attacked this crop. The caterpillars of another moth, probably *Aproaerema nerteria*, injured ground-nuts (*Arachis*) as well as kedelé.

Coconut pests included *Brachartona* [*catoxantha*], *Parasa lepida*, *Hidari irava*, the coconut beetle, *Oryctes rhinoceros*, and the palm weevil, *Rhynchophorus ferrugineus*. Hispid beetles did severe injury in Celebes in the dry season.

Cacao was attacked by the cacao moth [*Acrocercops cramerella*], which was numerous, and by a borer, *Xyleborus* sp.

Rubber on some estates was infested by *Coptotermes gestroi*, but rarely to a disquieting extext.

Cotton suffered some injury from *Earias fabia*.

Cinchona pests included *Helopeltis*, *Euproctis flexuosa* (in the dry season), mites and thrips. In one case the attack by thrips was so severe that all the full-grown leaves were lost.

Oil palms were infested by *Oryctes rhinoceros*, *O. trituberculatus*, *Rhynchophorus ferrugineus*, Psychids, and a Scolytid beetle.

Bananas were injured by the moth, *Nacoleia* (*Notarcha octasema*).

Ricinus was attacked by a Noctuid, *Achaea janata* (*Ophiusa melicerta*) and by leaf-caterpillars.

Pepper at an experiment station was badly injured, probably by a bug, *Elasmognathus hewitti*, which sucked the young fruits.

Rice pests included *Schoenobius incertellus* (*bipunctifer*), *Nymphula depunctalis*], *Scirpophaga* [*sericea*], *Spodoptera mauritia*, *Holotrichia helleri*, a bug (*Nezara*), a Pierine butterfly (*Catopsilia crocale*), and a gall-midge (*Cecidomyia* sp.).

Sugar-cane was attacked by the caterpillars of *Creatonotus gangis* (*Phissama interrupta*) and by an Aphid, *Oregma lanigera.*

Tobacco was infested by *Heliothis obsoleta, Phytometra* (*Plusia*) *signata, Prodenia litura,* and *Phthorimaea* (*Gnorimoschema*) *heliopa.* Baled tobacco was attacked by *Lasioderma* [*serricorne*], but fumigation with hydrocyanic acid gas proved effective.

Tea suffered little on the East Coast of Sumatra from *Helopeltis theivora,* but *Phytorus dilatatus* did considerable harm there.

LEEFMANS (S.). **De Klappertor en de Palmsnuitkever.** [The Coconut Beetle and the Palm Weevil.]—*Inst. Plantenziekten, Buitenzorg,* Bull. 17 [n. d.], 18 pp., 4 plates. [Received 16th May 1922.]

This information on *Oryctes rhinoceros,* L., and *Rhynchophorus ferrugineus,* Oliv., is taken from two recent publications already noticed [*R.A.E.,* A, ix, 45, 297].

DONGÉ (E.) & ESTIOT (P.). **Les Insectes et leurs Dégâts.**—*Paris,* Paul Lechevalier, 1921, 12mo, cxxix + 116 pp., 91 figs., 100 coloured plates. Price 15 francs.

The first section of this small volume deals in a simple manner with the morphology, biology and classification of insects. The chief families of economic importance in France are listed, in each case with notes on their habits. Formulae for insecticides, etc. are given, with a list of French entomological stations where the public can obtain advice. The main section is divided according to the character of the plants concerned, the pests involved being described in paragraphs, at the head of each of which the synonymy and French popular names are given. The practical value of the book is enhanced by an index covering all the scientific and popular names.

FEYTAUD (J.). **Le Cycle Normal des Générations de la Cochylis et de l'Eudémis.**—*Rev. Zool. Agric. et App., Bordeaux,* xxi, no. 3, March 1922, pp. 42–47, 2 figs.

An account is given of the life-history of the vine moths [*Clysia ambiguella* and *Polychrosis botrana*], and their seasonal cycles are compared in a diagram.

Carob Tree Destruction by the Great Capricorn Beetle.—*Cyprus Agric. Jl., Nicosia,* xvii, pt. 2, April 1922, p. 28.

The Cerambycid, *Cerambyx heros,* Scop., does considerable damage to carob and walnut trees in Cyprus. Eggs are laid beneath the bark in July, or in the crevices caused by faulty pruning. The grubs penetrate the wood and gradually work their way to the interior, where they feed for three to four years and then pupate in the spring. The remedy is systematic and careful pruning, so that no rough edges or cracks are left to harbour eggs. The trunks and main branches should be limewashed, and pieces of cotton wool soaked in benzine or turpentine should be placed in the holes and crevices and covered with mud in order to kill the insects by fumigation.

Mediterranean Fruit Fly.—*Cyprus Agric. Jl., Nicosia*, xvii, pt. 2, April 1922, pp. 41–42.

The Mediterranean fruit-fly [*Ceratitis capitata*], which a few years ago was causing much damage by attacking every kind of fruit, has now almost disappeared, owing to drastic measures on the part of the Agricultural Department during three or four years in succession. The recent free export of fruit has greatly assisted matters, as the ripe or over-ripe fruit is no longer left on the tree or on the ground.

HARRIS (J. B.). **The Apple Root Borer.**—*Jl. Dept. Agric. S. Australia, Adelaide*, xxv, no. 8, 15th March 1922, pp. 706–707.

The commonest species of apple root borer in the Northern District is *Leptops rhizophagus*, which causes a sudden withering of the foliage and young shoots owing to the partial destruction of the root system by the larvae. The female beetles, shortly after pairing, which occurs generally during October, deposit masses of about fifty eggs between two leaf edges, which are drawn together and sealed with a sticky secretion. The grubs feed on the butt and main roots and cut twisting channels in all directions in the surface of them. They apparently pupate during the winter months in small cavities in the soil, and emerge as adults in the spring. The grubs have been found only in moist clay soil, and the beetles seem to occur only where there is a heavy growth of timber and excessive rainfall. They apparently live on native timber, and orchards placed adjacent to this are most subject to attack. The beetles cannot fly, and so do not become rapidly distributed. The mature insects can be poisoned by a strong lead arsenate spray, and this might also prove effective against the newly hatched grubs as they eat their way out of the nest. Zinc collars around the trunks of the trees are recommended to prevent the adults from ascending for oviposition.

Regulations under "The Plant Diseases Act, 1914."—*Dept. Agric. Western Australia, Fruit Indust. Branch, Perth*, 1921, 21 pp. [Received 16th May 1922.]

This pamphlet gathers together all the regulations passed under the Plant Diseases Act, 1914, in Western Australia.

ILLIDGE (R.). **Insects of the Wattle-trees.**—*Queensland Naturalist, Brisbane*, iii, no. 3, February 1922, pp. 61–64.

The numerous insects that affect the various species of *Acacia* in the Brisbane district include: the moths, *Xyleutes eucalypti*, infesting the roots, and *Maroga unipunctana*, occurring in the stem and branches, and causing death by ringbarking; a weevil, *Chrysolophus spectabilis*, burrowing in the stem and branches; the cottony cushion scale [*Icerya purchasi*]; and the larvae of several butterflies, feeding on the foliage and flowers.

The following Cerambycids also occur:—*Sceleocantha glabricollis* on *Acacia cunninghami*; *Xystrocera virescens* sometimes on *A. baileyana*, but most abundant on *A. linifolia* and *A. decurrens*; *Pachydissus sericus*; *Phoracantha fallax*; *Didymocantha obliqua*; *Piesarthrius marginellus*, which cuts the branches off just above its burrow; *Uracanthus* sp., with habits similar to those of *P. marginellus*; *Stephanops nasuta*; *Phalota tenella*; *Probatodes piliger*; *Hebecerus crocogaster*;

H. marginicollis; *H. niphonoides*; *Symphyletes albocinctus*, which also occurs in young *Casuarina* saplings; *S. pulverulens*; *S. variolosus*; *S. vicarius*; *Penthea pardalis* and *P. solida*, occurring in the roots close to the base of the tree; *Rhytiphora rubeta*, boring in the main stems and larger branches, causing swellings; *R. polymita*, in stems of a small species of wattle; *Ropica exocentroides*; *Sybra acuta*; and *Ameipsis marginicollis*.

WOODWORTH (H. E.). **A Host Index of Insects injurious to Philippine Crops. II.**—*Philippine Agric., Los Baños*, x, no. 7, February 1922, pp. 321–329.

Since the publication of the first index [*R.A.E.*, A, ix, 584] a number of additions have been recorded, which are included in the present paper.

ANDREWS (E. A.). **On Caterpillar Control by Collection of Chrysalides.**—*Qtrly. Jl. Sci. Dept., Ind. Tea Assoc., Calcutta*, pt. 4, 1921, pp. 175–194, 1 plate.

The destruction of pupae turned up from the soil at the time of forking and thullying has become a matter of regular routine on many tea estates, and a great deal of infestation is thus prevented. From pupae collected on one of the estates the following species have been bred in the laboratory: the Sphingids, *Acherontia lachesis*, F., *Chaerocampa pallicosta*, Wlk., and *Sataspes ventralis*, Butl.; the Notodontid, *Phalera raya*, Moore; the Limacodids, *Hyphorma* sp., *Thosea sinensis*, Wlk., *T. cervina*, Moore, *T. divergens*, Moore, and *Altha castaneipars*, Moore; the Hypsid, *Hypsa alciphron*, Cram.; the Noctuids, *Agrotis* sp., *A. ochracea*, Wlk., *A. descripta*, Brem., *Cirphis* (*Leucania*) *loreyi*, Dup., *C. decisissima*, Wlk., *Arcilasisa plagiata*, Wlk., *Spirama retorta*, Cram., and *S.* (*Enmonodia*) *vespertilio*, F.?; the Geometrids, *Biston suppressaria*, Guen., *B. bengaliaria*, Guen., *Boarmia selenaria*, Hb., *B. acaciaria*, Boisd., *Medasina strixaria*, Guen., *Erebomorpha fulgurita*, Wlk., and *Abraxas sylvata*, Scop.; and the Tineid, *Agriophora rhombota*, Meyr.

Brief notes are given on the seasonal occurrence, habits and food-plants of these moths as well as the distinguishing characters of the pupae. The object of this paper is to encourage the adoption of this most valuable means of preventing and reducing insect infestation.

TIMBERLAKE (P. H.). **A Revision of the Chalcid-flies of the Encyrtid Genus** *Chrysoplatycerus*.—*Proc. U.S. Nat. Mus., Washington*, no. 2423, lxi, Art. 2, 1922, pp. 1–10, 1 plate.

Chrysoplatycerus ferrisi, sp. n., parasitic on *Pseudococcus adenostomae*, Ferris, is described from California. A key is given to the species of this genus.

RUSSELL (H. L.) & MORRISON (F. B.). **New Pages in Farming.**—*Ann. Rept. 1920–1921, Univ. Wisconsin Agric. Expt. Sta., Madison*. Bull. 339, February 1922, 142 pp., 40 figs. [Received 19th May 1922.]

In dealing with codling moth [*Cydia pomonella*], dusting proved on the whole a less satisfactory remedy than spraying; seven applications of dust were less effective than five of lime-sulphur and lead-arsenate sprays. Grasshoppers caused a serious outbreak in 1921 in the north

of Wisconsin, the long drought having dried up their natural breeding-places, with the result that they migrated to grain and hay fields The best poison bait proved to be bran, arsenic, salt and banana oil. The corn ear worm [*Heliothis obsoleta*] was very numerous and destructive, and no specific remedy is known for it. The climatic conditions were so favourable to the northern tobacco or tomato worm [*Protoparce celeus*] that a second generation appeared in late August and September. An effective remedy consisted of a dust of 1 part lead arsenate to 8 parts air-slaked lime, or a spray of 2 lb. lead arsenate to 50 U.S. gals. of water.

Cherry trees were so heavily infested with black cherry aphis [*Myzus cerasi*] that many lost their foliage, and the fruit was bitter and undersized. The correct treatment has not been determined, but tests are being made of 1 part nicotine sulphate to 1,000 parts water, with 2 lb. soap to each 50 U.S. gals. of spray. The cultivation of peas has considerably decreased owing to the ravages of the pea moth [*Cydia nigricana*]. Sowing should be as early as soil conditions permit, and peas should not be planted two years in succession. As the prevailing wind is generally northerly during the time of flight, it has been found that fields south, or even west or east, of the previous year's plantings suffer less than those to the north.

The potato leaf-hopper [*Empoasca mali*] destroys whole fields of early potatoes by the hopperburn that it causes. The remedies advocated by Dudley are quoted [*R.A.E.*, A, ix, 31]. It has been found that musk melons are also susceptible.

The effect of nicotine dust on various insects is described. The indications are that, given a higher nicotine content, and a machine that will throw the dust out in a cloud, these dusts are of great value against many chewing and sucking insects, but cannot be used to replace arsenicals against such insects as Colorado potato beetle [*Leptinotarsa decemlineata*] and cabbage worms [*Pieris*].

COCKERELL (T. D. A.). **Some Coccidae found on Orchids (Hom.).** —*Ent. News, Philadelphia, Pa.*, xxxiii, no. 5, May 1922, p. 149.

The Coccids recorded are *Aonidia pseudaspidiotus*, Lind., on stems of *Vanda teres*; *Chrysomphalus dictyospermi*, Morg., on *Coelogyne cristata*; and *Diaspis boisduvali*, Sign., on *Laeliocattleya victoriae* and *Odontoglossum rossi*. These records are all from Colorado.

HAYES (W. P.). **The External Morphology of** *Lachnosterna crassissima*, **Blanch. (Scarabaeidae, Coleop.).**—*Trans. Amer. Micr. Soc., Menasha, Wisconsin*, xli, no. 1, January 1922, pp. 1–28, 9 plates.

The contents of this paper are indicated by its title.

Section on Apiculture.—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 121–146.

The series of papers in this section dealing with apicultural problems comprises: Essentials of Apiary Practice and Management, by M. Pettit; The Correlation between some Physical Characters of the Bee and its Honey-storing Abilities, by J. H. Merrill; Time and Labor Factors involved in gathering Pollen and Nectar, by W. Park; The Cost of Poor Queens, by F. B. Paddock; Factors affecting the Success of American Foulbrood Campaigns, by S. B. Fracker; and Relation of Climate to Beekeeping Manipulations, by H. F. Wilson.

RUGGLES (A. G.). **Section of Horticultural Inspection. Address of Chairman.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 146–149.

The general lines adopted by the Minnesota horticultural inspection service and the results obtained are briefly outlined.

HARNED (R. W.) & KIMBALL (H. H.). **The Sweet Potato Inspection Service in Mississippi.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 149–153.

An account is given of the work of the sweet potato inspection service in Mississippi and the main points of difference between it and that of Arkansas. The chief aims of the service are to prevent the further introduction and spread of *Cylas formicarius* (sweet potato weevil) and injurious fungi, as well as any other pests occurring in other parts of the world.

SASSCER (E. R.). **Important Insects collected on imported Nursery Stock in 1921.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 158–162.

The pests intercepted during 1921 were: *Otiorrhynchus* (*Brachyrhinus*) *sulcatus*, F., in the soil amongst the matted roots of *Astilbe* from Holland; brown-tail moth [*Nygmia phaeorrhoea*, Don.] in French fruit and rose stock, and also in fruit seedlings from Holland; gipsy moth [*Porthetria dispar*, L.] in quince stock, larvae of *Acronycta rumicis*, L. (sorrel cutworm) on quince, cherry and rose, and pupae of *Apatela auricoma*, F. (dagger moth) on pear, quince and rose from France, and the latter on cherry from Holland; *Eumerus strigatus*, Fall. (lesser bulb fly) in narcissus bulbs from Holland; *Anuraphis tulipae*, Boy., on iris from England; *Cryptothrips dentipes*, Reut., on *Lilium candidum* from France; egg-masses of *Malacosoma neustria*, L., on apple seedlings from France; cocoons of *Emphytus cinctus*, L., on rose stocks from England, Ireland, France and Holland; *Aleurocanthus woglumi*, Ashby (black fly of citrus) on citrus foliage from Cuba and Jamaica, and on what appeared to be bay from the Bahama Islands; *A. spiniferus*, Quaint., on citrus leaves from Japan; *Anastrepha ludens* Lw. (Mexican fruit-fly) on mangos and sweet limes taken from immigrants at El Paso; *A. fraterculus*, Wied., on mangos and Cuban plums from Cuba, Mexico and Jamaica; the Mediterranean fruit-fly [*Ceratitis capitata*, Wied.] in coffee berries from Hawaii; larvae, apparently of *Conotrachelus perseae*, Barber, from Mexico and Costa Rica, *Heilipus* sp. from Mexico, and *Stenoma catenifer*, Walsh, from the Canal Zone and Mexico, all in avocados; *Cryptorrhynchus* (*Sternochetus*) *mangiferae*, F., in mango from Hawaii; *Cylas formicarius*, F., in sweet potatoes from Cuba and Mexico; *Euscepes batatae*, Waterh., in sweet potatoes from Jamaica, and the Bahama and Madeira Islands; *Metamasius sericeus*, Oliv., on sugar-cane from Cuba and in ships' stores and on banana leaves from Costa Rica; and *Platyedra* (*Pectinophora*) *gossypiella*, Saund., in cotton seed from England, Egypt, India, and from the interior of Mexico.

A list is also given of about nineteen of the more important scale-insects intercepted from various countries.

McLaine (L. S.). **A brief Resumé of Nursery Conditions in Holland, Belgium and France.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 162–167.

A short account is given of the nursery conditions and inspection service in the above countries.

Fracker (S. B.). **The Legal Aspect of Pest Control.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 167–169.

It is considered that the legal aspect of pest control, which is generally limited to the prevention of the introduction of foreign pests and nursery inspections, should be widened to include control of permanently established pests.

Headlee (T. J.). **Present Status of Gipsy Moth in New Jersey.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 170–172.

Since the season of 1920–21 [*R.A.E.*, A, ix, 351] scouting has been continued and only one new township found infested with gipsy moth [*Porthetria dispar*, L.]. The cost of the work in 1922 is expected to be about the same as for the previous year. The work is considered to be progressing satisfactorily.

Borodin (D. N.). **The Present Status of Entomology and Entomologists in Russia.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 172–176.

Brief notes are given on the position of systematic entomology in Russia, and some of the new organisations for economic entomology are mentioned, the methods of training specialists being indicated. New methods of combating injurious insects include the use of asphyxiating gases, supplies of which were available after the war. They were successfully employed against the Asiatic locust (*Locusta migratoria*) in the deltas of rivers, where the dense growth of cane renders ordinary spraying operations impossible.

New European Bee Disease threatens Beekeeping in America.—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 177–178.

Attention is called to the danger of the introduction of Isle of Wight disease into America, and legislative protective measures are suggested.

Essig (E. O.). **The Paradichlorobenzine Treatment.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, p. 178.

The paradichlorobenzine treatment has been successfully carried out in California against *Aegeria opalescens*, Hy. Edw., and no injury to root stocks has so far been observed; it was chiefly used on apricot trees. *Eriosoma lanuginosum*, Hart. (pear root aphis) has also been successfully controlled with no apparent injury to four-year-old pear trees on French roots.

Primm (J. K.). **Unusual Infestation of Bulb Mite in Greenhouse.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, p. 179.

A species of *Rhizoglyphus*, apparently *R. hyacinthi*, Boisd., is recorded as causing serious injury to smilax (*Asparagus medeoloides*) and asparagus fern (*A. plumosus*) in greenhouses in Pennsylvania.

Jones (W. W.). **Notes on** *Orchestes rufipes.*—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 179–180.

Rhynchaenus (*Orchestes*) *rufipes*, Lec., is apparently increasing in Utah, where it is recorded from *Salix* spp., *Populus angustifolia* and *Betula fontinalis* [*cf. R.A.E.*, A, x, 114].

Van Dyke (E. C.). **Destructive Bark-beetles in the Monterey Pine Forests.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, p. 180.

Bark-beetles have been able to develop to an enormous extent in California, owing to felled timber being allowed to remain in the forests. *Ips plastographus*, Lec., and *I. radiatae*, Hopk., are responsible for most of the damage done, but *Dendroctonus valens*, Lec., and *Pityophthorus* sp. also cause some injury.

Essig (E. O.). **Mealy Bug Control on Pear Trees.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 2, April 1922, pp. 181–182.

A mixture of 40 lb. whale oil soap, 5 U.S. gals. crude carbolic acid (25 per cent.), 10 U.S. gals. distillate emulsion (28 Bé.) and water to make up to 50 U.S. gals., has been used against *Pseudococcus maritimus*, Ehrh., on pear trees. This mixture is no more effective than miscible oil, but when prepared at home is very much cheaper. It should be used at a strength of one to twenty parts of water. The loose bark on the trunks and bases of the main limbs should be scraped away before treatment. In cases of serious infestation three applications were made during January and February.

Macdougall (R. S.). **Insect and Arachnid Pests of 1919.**—Separate from *Trans. Highland & Agric. Soc., Scotland*, 1920, 42 pp., 50 figs. [Received 24th May 1922.]

The pests recorded are a species of *Chermes*, probably *C. cooleyi*; *Megastigmus spermatrophus* and *Pityogenes bidentatus* on Douglas fir; *Tortrix viridana* (oak leaf tortrix); *Ips* (*Tomicus*) *acuminatus* (six-toothed pine beetle); *Anthonomus rubi* attacking raspberry, bramble, strawberry, plum and rose; *Lepidosaphes ulmi*, against which winter washes are advocated; *Cheimatobia brumata*, *Hybernia defoliaria* and *Anisopteryx aescularia*, causing great damage to foliage of many different trees; *Eriophyes pyri* (pear-leaf blister mite); *Blennocampa pusilla* (leaf-rolling sawfly), which may be destroyed by hand-picking on wild and cultivated roses; the Elaterids, *Agriotes obscurus*, *A. lineatus*, *A. sputator* and *Athous haemorrhoidalis*; *Hylemyia antiqua* (*Phorbia cepetorum*) (onion fly), particularly injurious to spring-sown onions; *Melolontha melolontha* (*vulgaris*); *Lucanus cervus*; *Sinodendron cylindricum*; *Tylenchus dipsaci* (*devastatrix*), injuring various field crops; *Macrosiphum granarium* (grain aphis) and *Phora* sp. on oats; and *Myzus persicae* (*Rhopalosiphum dianthi*) (turnip aphis) and *Brevicoryne* (*Aphis*) *brassicae* (cabbage aphis), which were particularly abundant during 1919.

The beneficial insects included *Clerus formicarius*, feeding on Scolytids, *Myelophilus* spp. and *Hylastes* spp.

MACDOUGALL (R. S.). **Insect and Arachnid Pests of 1920.**—Separate from *Trans. Highland & Agric. Soc., Scotland*, 1921, 38 pp. 18 figs. [Received 24th May 1922.]

The insects recorded are: *Saperda carcharias*, L. (large poplar longicorn) [*R.A.E.*, A, ix, 171]; *Hylesinus fraxini*, F., and *H. crenatus*, F., on ash; *Pityogenes chalcographus*, L., chiefly on spruce (*Picea excelsa*), the differentiating characters of the adults and brood galleries of this species and of *P. bidentatus* being described; and various gall-producing Cecidomyiids, including *Rhabdophaga saliciperda*, Duf., on willow, which may be controlled by cutting and burning infested shoots before the issue of the brood, and covering the attacked places with tar so as to entangle the emerging adults.

The ermine moths, *Hyponomeuta padellus*, L., *H. malinellus*, Z., and especially *H. padi*, Z. (*euonymellus*, L.), are destructive to fruit and other trees, and a brief account is given of the life-history of the latter.

Other pests recorded are *Hylemyia coarctata*, Fall. (wheat bulb fly), *Sitona lineata*, L. (pea and bean weevil), and *Ceuthorrhynchus pleurostigma* (turnip gall weevil).

A brief account is also given of the life-history of, and damage caused by *Anobium striatum*, Ol., in pine and spruce wood, etc.; *Sitodrepa panicea*, L. [*R.A.E.*, A, vi, 160]; *Ptilinus pectinicornis*, L.; *Xestobium rufovillosum*, DeG. (*tesselatum*, Ol.); and *Lyctus brunneus*, Steph., and *L. linearis*, Goeze (*canaliculatus*, F.). Various ways of treating and protecting furniture against the attack of these beetles are quoted.

McCARTHY (T.). **Insects infesting Stored Grain in New South Wales.** —*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 4, 1st April 1922, pp. 253–259, 12 figs.

This is an annotated list of species occurring during 1916–18 in stored wheat, together with a brief reference to the part played by each in the destruction of the grain. The species causing most damage were *Rhizopertha dominica*, F., *Calandra oryzae*, L., and *Tribolium ferrugineum*, F.

DA COSTA LIMA (A.). **E' confirmado am Pelotas o Centro de Infecção do Piolho de S. José. Energicas Medidas adoptadas.** [The Centre of Infestation by the San José Scale proved to be at Pelotas. The energetic Measures adopted.]—*Chacaras e Quintaes, S. Paulo*, xxv, no. 4, 15th April 1922, p. 290.

Scales, identified as *Aspidiotus perniciosus*, Comst. (San José scale) and traced to a garden at Pelotas, were found on peach twigs received from the State of Rio Grande do Sul, this being the second record of infestation from that source. Immediate measures were taken to prevent any further dissemination of infested material to other localities.

WAHL (B.). **Verheerendes Auftreten des Wiesenzünslers auf der Zuckerrübe in Niederösterreich.** [A Devastating Outbreak of *Loxostege sticticalis* on Sugar-beet in Lower Austria.]—*Mitt. Bundesanst. f. Pflanzenschutz, Vienna*, 1921, 7 pp. [Received 24th May 1922.]

At the end of June 1921 the beet webworm, *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., began ravaging the sugar-beet fields in many districts of Lower Austria, this being the first occasion that such an outbreak has occurred there. Two generations probably occur in this region.

Massnahmen zur Bekämpfung der Wiesenzünslerraupen, *Phlyctaenodes sticticalis,* **L.** [Measures against *Loxostege sticticalis.*]—*Bundesanst. f. Pflanzenschutz, Vienna* [n. d.], 2 pp. [Received 24th May 1922.]

These recommendations are based on experience gained in July 1921 against the beet webworm, *Loxostege* (*Phlyctaenodes*) *sticticalis,* L. The chief points have already been noticed from another source [*R.A.E.*, A, x, 255].

Special measures are needed when lucerne or similar crops are attacked. Lucerne should be cut immediately it is infested. It may be used as green fodder, or if it is allowed to grow for hay the larvae ultimately abandon the dry material and feed on the lucerne stubble, from which they can be collected by dragging a suitable metal gutter across the field. In the case of a lucerne field that it is intended to plough, ploughing should be done at once if the larvae appear, and isolation trenches should be dug around it, in which they can be destroyed.

Herstellung von Tabakbrühe aus Tabakstaub. [The Preparation of Tobacco Spray from Tobacco Dust.]—*Landw.-bakteriol. & Pflanzenschutzstation, Vienna* [n. d.], 1 p. [Received 24th May 1922.]

To prepare a spray containing about 1 per cent. of tobacco extract, 2 lb of tobacco dust, as obtained from the Austrian Régie, is soaked—with repeated stirring—in 5 gals. water and then allowed to settle. The liquid is then filtered through linen and is ready for immediate use. The addition of 1 part lysol to 20,000 of the liquid acts as a preservative. Wetting power is enhanced by adding soft soap or lysol prior to spraying. By using a larger proportion of dust, a stronger solution, such as is more generally useful, can be readily obtained.

WAHL (B.). **Maikäferflug, -Bekämpfung und -Verwertung.** [The Flight, Control and Utilisation of Cockchafers.]—*Mitt. Staatsanst. f. Pflanzenschutz, Vienna,* 1921, 6 pp. [Received 24th May 1922.]

In expectation of an exceptional occurrence of cockchafers [*Melolontha*] in Austria in 1921, directions are given as to the best methods of collection, this measure being compulsory by law. The collected beetles can be fed to pigs or used as manure, and various methods for utilising them in these ways are described. Loose compost heaps may be used to attract the ovipositing females.

DUPORT (L.). **Rapports sur le Fonctionnement de la Station entomologique de Cho-Ganh.**—*Supplements to Bulls. 132 & 133. Chambre d'Agric. Tonkin & Nord-Annam, Hanoi, nos. 13 & 14, April–September 1921,* 1922, 2 pp. & 3 pp. [Received 24th May 1922.]

In continuation of the work on the parasites of *Xylotrechus quadripes* [*R.A.E.*, A, ix, 510], the breeding of the Braconid, *Doryctes strioliger,* Kieff., has been carried on to the greatest extent possible, and nearly one million insects were reared during the nine months of 1921. Unfortunately, weather conditions seem to have a very marked influence on the development of this species ; cloudy, humid weather

and great heat both seem unfavourable to it. Attempts to rear other parasites, such as the Evaniid, *Pristaulacus nigripes*, Kieff., the Bethylid, *Sclerodermus domesticus*, Latr., and other Hymenopterous parasites have been disappointing, and it seems almost impossible to breed sufficient numbers to be of any economic value, though it is too early yet to pronounce definitely on this point.

UICHANCO (L. B.). **Biological Notes on Parthenogenetic** *Macrosiphum tanaceti*, **Linnaeus (Aphididae, Homoptera).**—*Psyche, Boston, Mass.*, xxix, no. 2, April 1922, pp. 66–78.

This paper deals with the moulting, movement, feeding habits and reproduction of *Macrosiphum tanaceti*, L.

This Aphid is apparently confined to a single food-plant, *Tanacetum vulgare*, on which it may be found from early spring until late in autumn feeding on the more succulent portions of the plant, especially on the growing parts of the stem.

CAESAR (L.). **The European Corn Borer.**—*Ontario Dept. Agric., 43rd Ann. Rept. Agric. & Exptl. Union 1921, Toronto*, 1922, pp. 42–44.

During the autumn of 1921 the corn ear worm [*Heliothis obsoleta*, F.] became very abundant in Ontario, and was in several instances mistaken for the European corn borer [*Pyrausta nubilalis*, Hb.]. A brief account is given of the introduction and the seasonal history of the latter. In Ontario the food-plants include all kinds of maize, of which the sweet varieties appear to suffer most. The amount of infestation also depends on the time of planting, the injury being greater on early maize.

SPENCER (G. J.). **Control Measures of the European Corn Borer in Ontario.**—*Ontario Dept. Agric., 43rd Ann. Rept. Agric. & Exptl. Union 1921, Toronto*, 1922, pp. 44–46.

Cultural practices for the control of European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario are described.

CRAWFORD (H. G.) & SPENCER (G. J.). **The Control of the European Corn Borer** (*Pyrausta nubilalis*, **Hbn.**).—*Canada Dept. Agric., Ent. Branch, Ottawa*, November 1921, Crop Protect. Leaflet no. 16, 4 pp. [Received 30th May 1922.]

The occurrence and life-history of *Pyrausta nubilalis*, Hb., in Canada, as well as remedial measures and the precautions to be adopted in 1922, are briefly stated.

BERLAND (L.) & SÉGUY (E.). **Sur un Papillon nuisible au Jasmin cultivé, le** *Glyphodes unionalis*, **Hübner, et sur un Tachinaire qui le parasite :** *Zenillia roseanae*, **B. B.**—*Bull. Soc. Ent. France, Paris*, 1922, no. 7, 12th April 1922, pp. 93–96.

Jasmin plantations in Callian (Var), where the plant is largely cultivated for the perfume industry, have been found to be infested with the Pyralid, *Glyphodes unionalis*, Hb. The moth is nocturnal in its habits, and evidently oviposits in the interior of the flowers, which open at night. The larva, after feeding inside for some time,

escapes by perforating the corolla in search of further food. The flowers so attacked do not open again and rapidly wither. From caterpillars reared in captivity, the Tachinid, *Zenillia roseanae*, B. B., was bred. The emergence of the adults of the parasite and of uninfested individuals of *G. unionalis* was simultaneous. The Tachinid evidently oviposits on the flowers, and some of the eggs are swallowed by the larvae of the host. *G. unionalis* is more generally known as an olive pest.

THOMPSON (W. R.). **Théorie de l'Action des Parasites entomophages. Les Formules mathématiques du Parasitisme cyclique.**—*C. R. Hebdom. Acad. Sci., Paris*, clxxiv, no. 18, 1st May 1922, pp. 1201–1204.

An attempt is made to devise mathematical formulae to indicate the activities of entomophagous parasites that may be expected at any given time

HASSON (J.). **Bekämpfung tierischer Schädlinge durch Vergasung des Bodens.** [The Control of Animal Pests by Fumigation of the Ground.]—*Wien. landw. Zeitg.*, lxx, 1920, p. 471. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 5-13, 26th May 1922, p. 194.)

In these experiments a field infested by larvae of *Agriotes* and other pests was fumigated with chloropicrin by means of a special apparatus. It comprises a container, placed on the front of an ordinary plough and fitted with an air pump worked by a rod connected with one of the wheels and with pipes to a series of five nozzles, any one of which can be shut off. These nozzles spray the chloropicrin on the earth turned up in the preceding furrow, on the sods that are being turned over and on all parts of the furrow. All pests are destroyed, but it is not known whether useful bacteria share the same fate. The apparatus uses about $1\frac{3}{4}$ pints of chloropicrin a minute.

HERRMANN (F.). **Untersuchungen über die Wirkung von Arsensalzen als insektentötende Mittel.** [Investigations on the Action of Arsenical Salts as Insecticides.]—*Ber. d. höh. Staatl. Lehranst. Obst- u. Gartenb. Proskau f. 1918-1919, Berlin*, 1921, pp. 99-105. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 5-13, 26th May 1922, pp. 198–199.)

A 3 per mille strength of Urania green produces marked spots on the leaves of apple and pear and turns the edges of oak leaves brown. These effects are also produced by a 4 per cent. strength of barium chloride. Even a weak solution of Paris green causes yet more injury if spraying is followed by dry, sunny weather. This is not the case with lead arsenate, even of $\frac{1}{2}$ per cent. strength.

SCHMIDT (C. W.). **Cahren-Fango, ein neues Mittel gegen Bekämpfung schädlicher Insekten im Garten und Feld.** [Cahren-fango, a new Material for combating Injurious Insects in the Garden and Field.—*Der Lehrmeister i. Garten u. Kleintierhof*, xviii, 1920, p. 258. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 5–13, 26th May 1922, p. 199.)

Cahren-fango is a dried and powdered mineral mud from the Eifel region. It is used as a dust and acts by clogging the respiratory apertures of insects.

DE WAAL (M.). **Prüfung des insektiziden Vermögens der Kompositen, insbesondere des** *Helenium autumnale*, **C.** [Tests of the Insecticidal Properties of Compositae, especially *H. autumnale*.]—*Pharmac. Weekbl.*, 1920, 1100-1107. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 5-13, 26th May 1922, p. 199.)

Finely ground, dry powders of sabadilla seed [*Veratrum sabadilla*], cevadin [an alkaloid from sabadilla] and insect powder affect the motor nerve system. Dutch *Chrysanthemum cinerariaefolium* and *Pyrethrum roseum* have a marked effect, while the blossom powder of *Helenium autumnale* is weak in its action. If, however, the essential oil from the last-named is mixed with *Althaea* root, a very deadly product results.

NECHLEBA (—). **Versuche der Bekämpfung der Nonne mit chemischen Mitteln (Insektiziden).** [Experiments in combating the Nun Moth with Insecticides.]—*Wien. allgem. Forst- u. Jagdzeitg.*, xxxix, 1921, p. 174. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 5-13, 26th May 1922, p. 210.)

The conclusion reached is that insecticides are not of practical value against the nun moth [*Liparis monacha*]. The larvae show great resistance to respiratory, stomach and contact poisons.

VERESTCHAGIN (B.). **Майскій Жукъ и мѣры Борьба съ нимъ.** [*Melolontha melolontha* and its Control.]—**Фурника** [*Furnika*], *Kishinev*, v, no. 15-16, 23rd April 1922, p. 14.

Melolontha melolontha occurs in great abundance every third year in Bessarabia, and a large number of adults are expected in 1923. A brief account is given of its life-history and of remedial measures; the latter include collection of adults and larvae, the use of trap crops, and destruction of the larvae by means of carbon bisulphide, etc.

ROSEN (H. R.). **The Mosaic Disease of Sweet Potatoes.**—*Arkansas Agric. Expt. Sta., Fayetteville*, Bull. 167, April 1920, 10 pp., 5 plates. [Received 30th May 1922.]

The sweet potato, *Ipomoea batatas*, is one of the most important crops in Arkansas. In investigating the mosaic disease affecting it, insect transmission was subjected to a severe test in the greenhouse. A heavy infestation of Aphids of two different species, both on the diseased and healthy plants growing alongside each other, with runners from each overlapping, failed to show any transmission of disease from affected to healthy plants. Mealy-bugs, whiteflies and red spiders were also present in abundance. It is possible that an infected plant may not show the disease, so that proof is not forthcoming until its roots are used for seed purposes.

FIELDS (W. S.) & ELLIOTT (J. A.). **Making Bordeaux Mixture, and some other Spraying Problems.**—*Arkansas Agric. Expt. Sta., Fayetteville*, Bull. 172, July 1920, 12 pp., 1 plate. [Received 30th May 1922.]

As regards the preparation of Bordeaux mixture the work done is acknowledged to be largely a duplication of that by Butler in New Hampshire [*R.A.E.*, A, iii, 518]. The following are the authors' general conclusions:—The best method of mixing the ingredients in

preparing Bordeaux mixture is that of pouring a very dilute solution of copper sulphate into a thick or strong lime solution. It is recommended that no old Bordeaux mixture be used for spraying trees or plants. This does not mean that old stock solutions of lime and copper sulphate cannot be utilised, provided that they are properly kept and not mixed until used.

Water hardness has no appreciable effect upon the precipitation of Bordeaux or Bordeaux and lead arsenate mixtures, or on the sedimentation of combined lime-sulphur and lead arsenate solutions. It is advisable to avoid very muddy waters for preparing spray mixtures.

The amount of arsenic in solution in Bordeaux or lime-sulphur spray mixtures when either acid or neutral lead arsenate is used is small.

BAERG (W. J.). **Spraying for San José Scale.**—*Arkansas Agric. Expt. Sta., Fayetteville*, Bull. 177, November 1921, 19 pp., 2 plates. [Received 30th May 1922.]

Tests in dormant spraying for San José scale [*Aspidiotus perniciosus*] with a number of substances were made during 1919–21, and the results are recorded in detail. Lime-sulphur proved the most effective material; wherever this was applied, all scales were dead thirty days after spraying. Scalecide gave the next best results, and has the advantage of having no unpleasant effects on the human skin. No injury to the trees was observed from it. Barium tetrasulphide is now supplied in powder form, which is less troublesome than the crystalline form. The combined effect of three years' use of this spray is very satisfactory, but results over a shorter time are less successful than with the above-mentioned materials. The dry materials, B.T.S., dry lime-sulphur and soluble sulphur, though very effective in 1921, were less satisfactory in the previous years, and are considered less successful than lime-sulphur, though they have the advantage of being easily transported over rough roads. Directions are given as to the correct time for spraying and the suitable dosage of lime-sulphur solution, which in the experiments recorded was 1 part to 8 of water.

COOPER (J. R.). **Commercial Grape Growing.**—*Arkansas Agric. Expt. Sta., Fayetteville*, Bull. 174, March 1922, 39 pp., 16 plates.

Comparatively little damage is done to grapes in Arkansas by either diseases or insects. Of the latter the following cause some trouble: the grape leaf-hopper [*Typhlocyba comes*], the grape-berry moth [*Polychrosis viteana*], the grape curculio [*Cocliodes inaequalis*], and the flea-beetle [*Haltica chalybea*]. The usual measures against these are mentioned.

HUDSON (H. F.). **Field Crop Insects. Crop Rotation to offset Injury.**—*Canada Dept. Agric., Ottawa*, Ent. Branch, Circ. 2, April 1922, 4 pp.

A study has been made of suitable crop rotations for Canadian fields in order to diminish as far as possible the injury caused by white grubs [*Lachnosterna*], wireworms and cutworms. A suggested rotation for a typical farming community of Western Ontario, where these insects are present and no specialisation of any crop is in evidence,

is a four-year rotation of oats followed by clover; the clover cut for hay and replaced by wheat; clover again in the spring of the third year, which may be pastured or allowed to grow; and the land then ploughed and prepared for cereals and roots.

CRIDDLE (N.). **The Western Wheat-stem Sawfly and its Control.**—*Canada Dept. Agric., Ottawa,* Pamphlet N.S. no. 6, April 1922, 8 pp., 2 figs.

Cephus cinctus, Nort. (Western wheat-stem sawfly) has become very injurious in Canada owing to having spread from wild grasses to cultivated plants such as wheat and rye. Much of the information given on the life-history and habits has already been noticed [*R.A.E.*, A, iii, 630; v, 265; viii, 464]. The remedial measures suggested are ploughing all infested stubble between 1st August and 6th June to a depth of not less than 5 in. and turning it completely upside down, this being the only way to prevent emergence of the flies. Rye grass should be cut between 5th and 20th July in order to kill the larvae before they reach the ground. On land intended for summer fallow a thinly sown strip or two of wheat will induce many flies to oviposit, and this crop should be ploughed about mid-July in order to kill the larvae. Immune crops that can be safely sown include oats, barley and winter rye, and clover, flax, and all other broad-leaved plants.

CHAMPION (H. G.). **Note on the Death of Chir** (*Pinus longifolia*) **Poles in the Almora Plantations of Kumaon.**—*Ind. Forester, Allahabad,* xlviii, nos. 4–5, April–May 1922, pp. 168–174 & 232–246, 2 figs.

For the last fifteen or twenty years at least there has been a considerable mortality among chir (*Pinus longifolia*) from sowings made since 1875 near Almora. This mortality is sufficient to nullify attempts to complete the stocking of the poorer areas. The general indications are that the attacks of the fungus, *Peridermium complanatum*, are in all cases primary, and that its presence is very easily overlooked at first, but reduced resistance and the flow of resin ultimately caused attract various destructive insects, of which the chief are *Cryptorrhynchus brandisi*, Stebbing, and a Tortricid moth, *Rhyacionia* (*Retinia*) sp. A Longicorn, *Notorrhina muricata*, Dalm., and a Scolytid, *Polygraphus longifolia*, Stebbing, are of less importance, though by no means negligible. *Ips longifolia*, Stebbing, *Melanophila ignicola*, Champ., and *Platypus biformis*, Chap., need not be taken into account. A Coccid, *Ripersia* sp., is often common, but while it is not impossible that its attack may facilitate an infestation by *Peridermium* or by insects, it certainly cannot be the chief cause of the injury.

SUBRAMANIA IYER (T. V.). **Notes on the More Important Insect Pests of Crops in the Mysore State. III. Diptera. IV. Rhynchota.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore,* iv, no. 1, [1922] pp. 18–24, 3 figs.

Mangos, guavas, peaches, melons, gourds, etc., as well as wild fruits such as *Diospyros montana*, are attacked by three or four species of fruit-flies.

Agromyzid pests include the cowpea and red gram pod flies, and the sorghum seedling fly. The pod flies probably belong to two different species, one of which oviposits on the stems of young cowpea plants, which wilt and die after the larvae have bored into the stems, and is occasionally a serious pest. The other species lays eggs in the tender red gram pods; the larvae feed on the seeds inside and pupate there. It is very common, but has not been noticed as a serious pest. The sorghum seedling fly was observed in Mysore for the first time in 1919, when large areas of young *Sorghum* were found damaged in June–July. The eggs are laid singly underneath the leaves, and the larvae enter the main stem through the central shoot, causing the plant to wither and die. Pupation takes place inside the stem. The fly is widely distributed in Mysore. *Sorghum* is also attacked by a Cecidomyiid, the earhead gall fly, very large areas being affected. The eggs are thrust into the unopened flowers, and the larvae feed on the pollen of the anthers, so that no grain is formed. Infested earheads have a general discoloured appearance and a marked depression in the middle of all infested flowers in a head. The pest has been observed since 1917. *Andropogon nardus* var. *coloratus* and *Panicum* sp. are alternative food-plants. The larvae were found to be heavily parasitised by two species of Chalcids about harvest time. Another Cecidomyiid, the cotton flower-bud fly, probably *Contarinia* (*Dasyneura*) *gossypii*, Felt, damaged Cambodia cotton in July 1914, but has not been observed as a pest since then. *Pachydiplosis oryzae*, Wood-Mason, was first noticed in 1920, both in a nursery bed and on transplanted paddy, where almost every shoot was attacked.

Injurious Rhynchota include *Nezara viridula*, L., which is very common and an occasional serious pest of wheat, coriander and horse-gram in the cold season – November–January. Collection with hand nets has proved effective. *Coptosoma cribaria*, F., is widely distributed and is occasionally a serious pest of lablab, red gram, etc., and also occurs on wild plants and avenue trees such as *Pongamia glabra*. *Anoplocnemis phasiana*, F., a minor pest, occurs on red gram and egg-plants; in one case it injured the tender shoots of grape-vine. *Dysdercus cingulatus*, F., occurs wherever cotton is grown, and is occasionally a serious pest in January–March. *Oxycarenus laetus*, Kby., found wherever cotton is grown, is a minor pest. The mango hoppers, *Idiocerus clypealis*, Leth., *I. atkinsoni*, Leth., and *I. niveosparsus*, Leth., do serious damage to mango blossoms. There are 5–6 generations in the season. The chief breeding season corresponds with the appearance of the blossoms. A pre-blossom spray of fish-oil resin soap has been found fairly effective. A number of Aphids occur on both cultivated and wild plants. In certain years they are a serious pest on cotton in June and July while it is still young, and on tobacco in September–December. Kerosene emulsion or fish-oil soap are effective remedies.

EHRHORN (E. M.). **Division of Plant Inspection. Report for October 1921.**—*Hawaiian Forester & Agric.*, *Honolulu*, xviii, no. 12, December 1921, pp. 268–270. [Received 30th May 1922.]

Parlatoria zizyphus, *P. pergandei* and *Hemichionaspis aspidistrae* were intercepted on pomelo, and *Pseudococcus comstocki* on litchi trees, tangerines and sand pears from China; and *Lepidosaphes ficus* on sand pears from Japan.

HOOPER (C. H.). **The Insect Visitors of Fruit Blossoms and the Pollination and the Fertilization of Fruit.**—*The F.B.G. Jl, London*, i, no. 4, April 1922, pp. 93-98, 1 fig.

This is a summary of observations on the insect visitors to fruit blossoms and of experiments in the pollination of hardy fruits. The observations aimed at obtaining a general idea of the subject, and do not give precise data as to the species concerned. With regard to their relative value for fertilisation purposes, hive-bees, and probably also bumble-bees, are very perfect pollen carriers, and the smaller wild bees, such as *Andrena*, are also good, while flies appear to be of little value, and many beetles eat the pollen or parts of the flower and do not move from plant to plant.

Mordvilko's Keys for the Determination of Aphids living continuously or temporarily on Graminaceous Plants and Sedges.—*Bull. Ent. Res., London*, xiii, pt. 1, May 1922, pp. 25-39.

A condensed translation of the keys previously mentioned [*R.A.E.*, A, x, 58] is here published.

WATERSTON (J.). **On the Chalcidoid Parasites of Psyllids (Hemiptera, Homoptera).**—*Bull. Ent. Res., London*, xiii, pt. 1, May 1922, pp. 41-58, 7 figs.

The new species described are *Psyllaephagus cellulatus* and *Pachyneuron crassiculme*, bred from *Rhinocola populi*, Laing, on *Populus euphraticus* in Mesopotamia; *Encyrtus pulvinatus* and *Tetrastichus dryi*, bred from *Trioza citri*, Laing, on *Citrus* in Kenya Colony; *Chiloneurus praenitens*, from galls of a Psyllid (? *Trioza* sp.) in Jamaica; and *Tetrastichus radiatus* bred from nymphs of *Euphalerus citri* on lemon leaves in India.

The original descriptions of the following parasites of Psyllids are quoted:—*Sceptrophorus solus*, How., from galls of *Trioza magnoliae*, Ashm., on red bay (*Persea carolinense*) in Florida, *Psyllaephagus pachypsyllae*, How., from *Pachypsylla celtidis-gemma*, Riley, in Maryland; and *P. trioziphagus*, How., from galls of *Trioza diospyri*, Ashm., on persimmon (*Diospyros virginiana*) at Washington.

MARSHALL (G. A. K.). **Some Injurious Neotropical Weevils (Curculionidae).**—*Bull. Ent. Res., London*, xiii, pt. 1, May 1922, pp. 59-71, 2 plates, 4 figs.

The new species described include:—*Diaprepes capsicalis*, adults of which have been observed feeding on pepper (*Capsicum*), and *Lachnopus coffeae* and *L. coffeae montanus*, feeding on young coffee leaves, from Porto Rico; *Cholus wattsi*, which causes appreciable damage to pineapples in Grenada, and may apparently be controlled by good cultivation, absence of shade and collection of adults; *Conotrachelus psidii*, attacking guava fruits (*Psidium guayava*), and *Pianurus papayanus*, which bores into the leaf-stems of papaw (*Carica papaya*), from Brazil; and *Lechriops psidii*, feeding on fruits of guava, and *Ampeloglypter cissi*, feeding on the tender shoots of *Cissus ampelopsis*, in Porto Rico.

Other species dealt with are *Exophthalmodes roseipes*, Chev., which attacks cotton in Porto Rico, but is more abundant on *Citrus*, and *Coelosternus granicollis*, Pierce, attacking stems of cassava (*Manihot utilissima*) in Brazil.

DRY (F. W.). **Notes on the Coconut Beetle** (*Oryctes monoceros*, **Ol.**) **in Kenya Colony.**—*Bull: Ent. Res., London*, xiii, pt. 1, May 1922, pp. 103–107.

This is a brief account of work of a preliminary nature carried out on the East African coast mostly between August 1920 and February 1921. Of thirty records the average duration of the egg-stage of *Oryctes monoceros*, Ol., was 15 days, with a minimum of 12 and a maximum of 20 days. The beetles do not lay eggs readily in captivity. They were kept in two-pound biscuit tins about one-third filled with powdered material from the inside of decaying coconut logs, in which the eggs are mostly laid in the field. In captivity they fed readily on the husk of unripe coconuts and bits of sugar-cane; in the field they feed on the young fronds at the top of the palm. Although a number of females lived more than a hundred days, the largest number of eggs obtained from one individual was 30, but it is thought that a greater number are laid under field conditions. Owing to the high mortality great difficulty was experienced in rearing the larvae. The average duration of the larval stage was probably 100 days, the shortest being 82. The extremes of the pupal period were 19 and 28 days, with an average of 21. Cocoons were apparently only constructed when the insects were confined in fibrous material, in the field pupation occurs just below the material in which the grubs have fed. About four and a half months elapse between oviposition and the emergence of the adult. Logs exposed to weather conditions may very quickly become breeding grounds for the beetles.

The usual methods of control are the destruction of these logs and the collection of the beetles. From a plantation of about 1,250 acres, containing approximately 50,000 trees, 13,072 beetles were collected in three years; of these 7,100 were collected in 1918, whereas in 1920 the numbers were reduced to 632. Similar counts have also been made on other plantations. All stages of the insect may be found at any time. The mortality due to overcrowding in the breeding-places is probably a factor exercising "facultative control."

From a comparison of the extent of beetle damage in areas where the conditions affecting the insect were strikingly different, it appears that old trees are attacked more than young ones. If native plantations remote from thick bush were kept free from breeding-places, they would suffer comparatively little attack. In the bush surrounding a European plantation eggs and larvae were obtained from dead logs, chiefly dead mukoma palms, but in this material other beetle grubs were much more plentiful, and they were living in much harder material than any in which *O. monoceros* was found. From these grubs a Cetoniid, *Pachnoda cuparypha*, Gerst., has been reared. There are large areas of similar bush along the coast belt, and the relation of *O. monoceros* to it needs investigating. The present observations suggest that though it is a source of beetles, it may not provide a favourable breeding ground for them.

THEOBALD (F. V.). **An Aphid Genus and Species new to Britain** (*Trilobaphis caricis*).—*Ent. Mthly. Mag., London*, lviii, no. 697, 3rd Ser. viii, no. 90, June 1922, pp. 137–138, 2 figs.

The viviparous female of *Trilobaphis caricis*, gen. et sp. n., is described from Wales, where it was taken on *Carex remota*.

LAING (F.). *Rhinocola eucalypti,* **Mask., in England.**—*Ent. Mthly. Mag., London,* lviii, no. 697, 3rd Ser. viii, no. 90, June 1922, p. 141.

Rhinocola eucalypti, Mask., is recorded from Suffolk on *Eucalyptus.* It has been reared through all stages at Oxford. During the summer it lives outdoors on plants used for bedding purposes. Under glass, this Psyllid may be controlled by fumigation.

TROUVELOT (B.). **La Teigne de la Pomme de Terre. Moyens de Lutte. Acclimatation d'un Auxiliare.**—*Rev. Hist. Nat. Appl., Paris,* 1ère Partie, iii, no. 4, April 1922, pp. 125–128.

This article briefly describes the life-cycle of the potato moth, *Phthorimaea operculella,* Z., refers to its introduction into France in the early years of the present century, and mentions the measures usually employed against it, including the importation from the United States of a Braconid parasite, *Habrobracon johannseni,* Vier. [*R.A.E.,* A, x, 86]. At present no definite conclusions are available regarding the establishment of this parasite.

LAWSON (P. B.). **The Cicadidae of Kansas.**—*Kansas Univ. Sci. Bull., Lawrence,* xii, no. 2, 15th March 1920, pp. 309–376, 10 plates. [Received 9th May 1922.]

This systematic study deals with 21 species that have been recorded from the State. Further collection will probably reveal the existence of several more. A remarkable number of cicadas appear to reach one of the limits of their geographical distribution in Kansas, the convergence of many species of varied distribution being undoubtedly due to its central geographical position, to the extremes of its rainfall, and to its varying elevation.

An attempt has been made in this paper to determine the importance of various structural characters as aids in systematic work, especially those of the ovipositor.

SCHOENICHEN (W.). **Praktikum der Insektenkunde nach biologisch-ökologischen Gesichtspunkten.** [A practical Handbook to biological and ecological Entomology.]—*Jena,* Gustav Fischer, 2nd edn., 1921, 8vo, x + 227 pp., 261 figs. Price 68 Marks in paper, 80 Marks cloth.

This handbook on the practical study of insects is not intended as an introduction to their comparative anatomy or histology, but aims at assisting the student in his early study of biology and the teacher in the preparation of his subject. It also contains data helpful to collectors. The present revised second edition contains a new section on the Thysanura. Particular attention is paid to the Coleoptera, Hymenoptera and Diptera that visit blossoms, and to insects of agricultural and medical importance.

CAULLERY (M.). **Le Parasitisme et la Symbiose.**—*Paris,* Gaston Doin, 1922, 16mo, 400 pp., 53 figs. Price 14 francs, cloth.

The matter discussed in this volume formed the subject of the author's lectures at the Sorbonne in 1919–1920.

Parasitism, from the point of view of general biology, is one of the most significant manifestations of evolution, and has given rise to

definite types of organisms deeply modified by their specialised conditions of life. It is not a condition that can be strictly defined, being connected by an imperceptible transition with a looser association, commensalism, on the one hand, and a closer one, symbiosis, on the other.

These general problems are discussed with the aid of concrete examples, preferably such as have been the subject of recent research. While more attention is devoted to parasitism in animals in its widest sense, the main facts relating to this phenomenon in the vegetable kingdom are also noticed.

WÜNN (H.). *Physokermes graniformis*, **n. sp.**—*Neue Beiträge zur system. Insektenk., Beilage zur Zeitschr. wiss. Insektenbiol., Berlin*, ii, no. 4, 1st June 1921, p. 29.

Physokermes graniformis, sp. n., is described from young trees of *Abies pectinata* in Alsace-Lorraine.

TÖLG (F.). **Beschreibung neuer Cecidomyiden aus der Wiener Gegend.** [A Description of new Cecidomyiids from the Vienna Region.]—*Neue Beiträge zur system. Insektenk., Beilage zur Zeitschr. wiss. Insektenbiol., Berlin*, ii, no. 5, 15th August 1921, pp. 33-35.

The new species include ***Phaenobremia kiefferiana***, feeding on Aphids; *Feltiella acarinivora*, feeding on mites; *Contarinia humuli*, producing galls on hops; and *Inostemma falcata*, parasitising gall-midge larvae.

BURKHARDT (F.). **Beiträge zur Biologie von** *Tribolium navale*, **Fabr.** (*ferrugineum*, **Fabr.**). [Contributions to the Biology of *T. castaneum.*]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvii, no. 1–2, 15th January 1922, pp. 1–3, 1 fig.

Tribolium castaneum, Hbst. (*navale*, F.), which plays a subordinate rôle in Germany as a pest of stored flour and grain, does attack entire grains, contrary to the accepted view that only broken ones are affected. Injury by the larvae and adults is limited to the germ of the grain and has been observed in rye and wheat. An extensive infestation of wheat intended for seed may therefore be of some importance.

LOVETT (A. L.). **The Cherry Fruit Fly** (*Rhagoletis cingulata*, **Loew**).—*16th Bienn. Rept. Oregon State Bd. Hortic., Portland*, 1921, pp. 107–109, 2 figs. [Received 1st June 1922.]

Infestation of cherries by *Rhagoletis cingulata*, Lw. (cherry fruit-fly) is becoming more widely spread and more frequent in Oregon. The damage is not generally apparent until the fruit is mature, when discoloration and holes appear on the skin, and the interior is found to be decayed and to contain the larva. The flies are found about 8th June, and towards the end of the month young maggots tunnel into the fruit. During late July they leave the fruit and drop to the ground, where they pupate, emerging as adults in the following spring.

The poison sprays that have been found successful in Canada [*cf. R.A.E.*, A, viii, 413] have been tested for Oregon conditions, and the best formula proved to be ½ lb. sodium arsenate with 2½ lb. brown sugar or 2 U.S. quarts syrup in 8 U.S. gals. water. Applications should be made when the adults first appear, again ten days later and again after another week. The foliage of adjacent shrubs and trees should also be sprayed.

The Mally Fruit Fly Remedy. For the Prevention of Maggots in Fruit by the Destruction of the Parent Flies before Eggs are laid.—*16th Bienn. Rept. Oregon State Bd. Hortic., Portland,* 1921, pp. 109–113, 6 figs. [Received 1st June 1922.]

The information contained in this paper has been noticed from another source [*R.A.E.*, A, iv, 392; ix, 98.]

FELT (E. P.). **European Corn Borer.**—*16th Bienn. Rept. Oregon State Bd. Hortic., Portland,* 1921, pp. 113–114. [Received 1st June 1922.]

The general situation with regard to the European corn borer, *Pyrausta nubilalis*, Hb., in various States is discussed. There are likely to be two generations of the moth in Oregon, at least in the warmer maize-growing districts. Attention is called to the rigid quarantine regulations that have been established in a number of States with the object of restricting further spread of this pest.

LOVETT (A. L.). **The Indian Meal Moth** (*Plodia interpunctella*, **Hb.**). —*16th Bienn. Rept. Oregon State Bd. Hortic., Portland,* 1921, pp. 118–123, 3 figs. [Received 1st June 1922.]

Plodia interpunctella, Hb. (Indian meal moth) is the most generally destructive pest of stored food products in the north-western United States. Measures recommended against infestation are the frequent cleaning out of storehouses, movement of stored packages and stirring of exposed material, the use of insect-proof packages, such as cartons with an inner sealed container of waxed paper, the repetition of disinfection immediately before export, exposure to heat at 125° to 130° F. for one hour, fumigation with carbon bisulphide, the disinfection of empty warehouses by means of sulphur fumigation, and the recent method of vacuum fumigation [*R.A.E.*, A, viii, 241, 507].

LOVETT (A. L.). **Strawberry Pests.**—*16th Bienn. Rept. Oregon State Bd. Hortic., Portland,* 1921, pp. 155–162, 2 figs. [Received 1st June 1922.]

This paper is a revision of part of an earlier one [*R.A.E.*, A, i, 131]. The plan that has been found most successful against *Otiorrhynchus ovatus*, L. (strawberry root weevil), which is the most injurious strawberry pest in Oregon, is one that has also been adopted by Canadian growers, namely, to grow strawberries only for one full-crop year and then plough the field immediately after the harvesting of the main crop.

Less important pests are the moths, *Aristotelia abscondetella* (strawberry crown-miner) and *Aegeria* (*Sesia*) *rutilans* (strawberry root-borer).

CARPENTER (P. H.) & ANDREWS (E. A.). **A Note on the Value of different Insect Control Methods in Tea and against Mosquito Blight in particular.**—*Indian Tea Assoc., Calcutta,* 1922, 24 pp. [Received 1st June 1922.]

The numerous processes for insect suppression that have been successively practised since the early days of economic entomology are reviewed, and their value with regard to successful growing of tea is discussed. Many difficulties stand in the way of the treatment of tea bushes by any of the more usual methods, such as spraying or

control by natural enemies, and it is now realised that immunity from insect attack, produced by the injection of caustic potash, promises to be the most successful means of obtaining copious flushes of tea [*R.A.E.*, A, viii, 204 ; x, 153]. While the older methods have a certain value as accessory measures, it is far better policy to attempt to control *Helopeltis* by careful cultivation, improved drainage, the use of proper agricultural implements and the application of suitable substances to the soil.

SEVERIN (H. H. P.). **Control of the Leafhopper.**—*Facts about Sugar, New York*, xiv, nos. 16 & 17, 22nd & 29th April 1922, pp. 312–313 & 332–333.

A study of the beet leaf-hopper, *Eutettix tenella*, Baker, and of its rôle in the dissemination of curly-leaf, has shown that many of the nymphs and adults are non-infective under natural conditions, and it is evident that certain plants growing in the areas where beet is cultivated do not harbour the virus of curly-leaf and that the hoppers breeding on such weeds are non-infective. The transmission of the disease by infective over-wintering adults from plants in the cultivated areas to vegetation on the plains and foothills of California has already been described [*R.A.E.*, A, vii, 474]. It has also been proved, however, that an infective leaf-hopper, having completed all the nymphal instars on an infected beet plant, does not transmit curly-leaf daily; in an experiment on these lines only five plants developed the disease out of 49 beets used.

In years with heavy, early autumn rains, winter treatment may have to be adopted if a large number of leaf-hoppers remain behind in the cultivated areas, but if no green vegetation is available the number of stragglers will be almost negligible.

Experiments with nicotine dust as a remedy, made after careful study of the flights and seasonal appearances, show that from four to six applications are necessary to control the spring brood, and this would become too expensive in a natural breeding area. The possibility of sugar companies reducing the cost of nicotine dust by using the waste lime from the manufacture of beet-sugar to replace the kaolin, and suggestions for a combined dusting and mixing machine are discussed. If these methods proved practicable, there would still be the difficulty of shortage of nicotine, and the possibility of sugar companies growing their own tobacco for the purpose is briefly touched upon.

MOZNETTE (G. F.). **The Red Spider on the Avocado.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 1035, 17th February 1922, 15 pp., 11 figs., 1 plate.

These observations on *Tetranychus yothersi*, McG., were carried out during 1918 and 1919 in Florida. Some food-plants have already been recorded for this mite [*R.A.E.*, A, iii, 306]; the author found it on West Indian and Guatemalan varieties of avocado (*Persea gratissima*), mango (*Mangifera indica*), camphor (*Cinnamomum camphora*), Australian silk oak (*Grevillea robusta*), *Eucalyptus* sp., *Terminalia arjuna*, *Anona squamosa*, *Cucumis sativus* and *Icacorea paniculata*. Descriptions are given of the various stages.

The incubation period varies from 4 to 11 days according to temperature and general climatic conditions; during April and May,

with mean temperatures between 70° and 80° F., it lasted 4–5 days. The average length of the larval stage is 2·58 days, of the first nymphal stage 2·8 and of the second 2·84.

The length of the adult life also varies according to temperature and possibly other conditions. The average duration of the life-cycle is 14·2 days, allowing 17 generations during the period of activity, which extends for about 240 days, from the end of August to the beginning of April, but this number is influenced by climatic conditions and other factors interfering with the normal activities of these mites in the field. Intermittent rains often interfere with the regularity of the generations. Drenching and frequent rains may prevent the red spider from becoming established on the trees during the summer in Florida.

The predatory enemies of this pest are *Scolothrips sexmaculatus*, Perg., feeding on larval and adult stages; *Chrysopa lateralis*, Guér., feeding on the larvae; *Scymnus utilis*, Horn, the most important enemy of the red spider, feeding on all its stages; and *S. kinzeli*, Casey, and *Leptothrips mali*, Hinds, feeding on larvae and adults.

Experiments with insecticides are described. After the fruit has been picked, liquid lime-sulphur should be used during the winter at the rate of 1 : 60, but if the temperature is above the normal and the trees do not attain a thoroughly dormant condition, the spray should be used at the rate of 1 : 75. For applications before the fruit is picked 40 per cent. nicotine sulphate 1 : 900 with the addition of 2–3 lb. of fish-oil soap to every 100 U.S. gals. of diluted spray is recommended. Sulphur dust was very effective in the experiment, but could not be satisfactorily combined with the nicotine sulphate so as to be a practical insecticide for general application.

SIMMONS (P.). **Controlling the Ham or Cheese Skipper.**—Separate from *National Provisioner, Chicago*, 29th April 1922, 2 pp.

A brief account is given of the life-history of the cheese skipper [*Piophila casei*, L.] [*R.A.E.*, A, ii, 572].

At temperatures of 80° [F.] and higher, the feeding period of the larva only lasts five days and growth is rapid. All stages are prolonged at lowered temperatures. The minimum life-cycle observed was 12 days from adult to adult. Under natural conditions the average is probably two generations a month during the summer. The red-legged ham beetle [*Necrobia rufipes*, DeG.], although a natural enemy of this pest, cannot be relied on for its control as it is itself an undesirable meat pest. *Pachycrepoideus dubius*, Ashm., may prove useful as a parasite of the pupa.

To prevent infestation all doors and windows should be fitted with screens at least as fine as 30 meshes to the inch. Infested rooms can be fumigated with sodium cyanide at the rate of one pound to 1,000 cubic feet for 24 hours. In tightly sealed rooms at a temperature over 60° the unprotected larvae and pupae will also be killed. All food should be removed before fumigation.

The Tobacco Slug.—*Rhodesia Agric. Jl., Salisbury*, xix, no. 2, April 1922, p. 130.

Owing to the prevalence of *Lema bilineata*, Germ., in the Union of South Africa, the importation of tobacco leaf into Southern Rhodesia from that territory, except under the authority of the Director of

Agriculture, has been prohibited by a notice contained in the Government Gazette of 17th February 1922. It is hoped that the introduction of this beetle may thus be prevented.

Carter (W.). **Notes on some Insects affecting Native Cottonwoods.**—*Canadian Ent., Orillia*, liv, no. 2, February 1922, pp. 25-26. [Received 1st June 1922.]

The Noctuid, *Ufens plicatus*, Grt., has been found in abundance on poplar trees in Alberta. The larvae feed on the bark. This moth is heavily parasitised by *Apanteles* sp. and by Tachinid larvae. The eggs are laid in the cracks of the bark; all split bark should therefore be removed. The trees generally survive the presence of the pest, but their appearance is spoiled, and the open wounds often become filled with water and harbour many Dipterous larvae feeding on the decaying matter. Mature trees are apparently immune from attack.

Other insects occurring in the cracks in the bark included *Rhynchagrotis placida*, Grt., and *Catocala* sp.; the latter is also parasitised by *Apanteles* sp.

Un Parasite du Pou Rouge.—*Rev. Hortic. Algérie, Algiers*, xxvi, no. 4, April 1922, p. 60.

A large consignment of the Chalcid, *Prospaltella lounsburyi*, Berl. & Paoli, has been brought from Madeira to Florence for the control of *Chrysomphalus dictyospermi*.

Icerya [*purchasi*] is said to be of practically no importance in Madeira owing to the activities of *Novius cardinalis*.

Robinet (E.). **L'***Icerya purchasi*.—*Rev. Hortic. Algérie, Algiers*, xxvi, no. 4, April 1922, pp. 60-61.

The following solutions are advocated as sprays against the increasing numbers of *Icerya purchasi*, 25 parts resin, 13 caustic soda, 5 fish oil and 2·5 cresylol, or 35 parts resin, 25 carbonate of soda, 5 caustic soda and 10 fish oil.

For winter applications 2–3 per cent. solutions should be used, but they must be made weaker for summer use if scorching occurs. The soil around each tree should be sterilised by fire or watering with insecticides.

Ramakrishna Ayyar (T. V.). **The Weevil Fauna of South India with special Reference to Species of Economic Importance.**—*Agric. Res. Inst., Pusa, Calcutta*, Bull. 125, 1922, 21 pp., 20 plates. [Received 6th June 1922.]

Of some 190 species here recorded over 40 are of economic importance. They include:—*Episomus lacerta*, F., widely distributed in the plains, causing appreciable damage to field beans (*Dolichos lablab*) and other pulse crops during the cold weather, and also recorded on *Erythrina*, and as defoliating teak and *Dalbergia latifolia*; *Myllocerus viridanus*, F., occurring on a variety of field crops and trees, including ground-nuts, *Sesbania*, jute, teak and guava; *M. subfasciatus*, Guér., defoliating *Solanum melongena* in the plains, potato in the Nilgiris, and apple in Bangalore; *M. dentifer*, F., fairly well distributed throughout South

India, and occurring on ripening rice in the Malabar district without apparently causing much injury, and also on ground-nuts; *M. discolor*, Boh., widely distributed on various plants such as *Sorghum*, maize, sugar-cane, *Eleusine*, *Hibiscus cannabinus*, and trees such as mango, *Zizyphus*, *Acacia*, *Dalbergia* and teak, often causing appreciable damage to foliage, and the larvae sometimes feeding on rootlets; *Atactogaster finitimus*, Fst., a common species often found in abundance after rain in October and November damaging young cotton plants; *Lixus brachyrhinus*, Boh. (amaranthus stem weevil), found all over South India; *Cylas formicarius*, F. (sweet potato weevil); *Apion amplum*, Fst., found on green gram (*Phaseolus*) in Coimbatore, and on *Anacardium occidentale* on the West Coast; *Apoderus tranquebaricus*, F., chiefly on mango and *Terminalia catappa*, the young larvae living inside the rolled leaves; *Attelabus discolor*, F., on *Anogeissus latifolia* in the hills around Coimbatore, and on *Terminalia paniculata* in Malabar; *A. octomaculatus*, Jek., attacking *Grewia tiliaefolia* in Coimbatore, and on *G. hirsuta* in Malabar; *Eugnamptus marginatus*, Pasc., attacking young mango foliage; *Rhynchaenus mangiferae*, Mshl., mining in mango leaves; *Alcides bubo*, F., causing considerable damage to cluster beans (*Cyamopsis*), indigo, and particularly *Sesbania grandiflora* in South India; *A. leopardus*, Ol., on a wild plant (*Trichodesma zeylanica*) in Malabar, and which, though the cotton shoot borer of Northern India, has not been noted on cotton in South India till now; *A. affaber*, Boh., very destructive to *Hibiscus cannabinus* and Cambodia cotton in Coimbatore, on *Ficus bengalensis* in Bengal, and occurring on rice in Malabar, though not as a pest; *A. pictus*, Boh., breeding in the main stems of *Dolichos lablab*; *Cryptorrhynchus mangiferae*, F., the mango-stone weevil of South India, but only causing serious injury when damaging the fruit pulp; *Pempheres affinis*, Fst., causing serious damage to cotton, chiefly the Cambodia variety, by boring under the bark of the stems and producing galls, also occurring on *Hibiscus rosasinensis*, *H. esculentus*, *Sida*, *Abutilon*, etc.; *Athesapeuta oryzae*, Mshl., which is not a rice pest, though commonly occurring in rice-fields [*R.A.E.*, A, iv, 127]; *Ceuthorrhynchus asperulus*, Fst., breeding inside red gram blossoms; and *Cosmopolites sordidus*, Germ., occasionally injurious to the stems of growing banana plants in Malabar and the Northern Sircars.

Species of *Astycus* are occasionally reported as defoliating cultivated plants in Upper India, but up to the present none of them have appeared as pests in South India.

Departmental Activities: Entomology.—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 5, May 1922, pp. 399–401.

Attempts have been made to introduce the polyhedral wilt disease of the wattle bagworm [*Acanthopsyche junodi*, Heyl.] into fresh districts, but the results are at present uncertain. A new fungous disease, distinct from *Isaria*, has been found attacking this moth, and its value as a control measure is being investigated.

The parasite [*Aphelinus mali*, Hald.] of the woolly aphis [*Eriosoma lanigerum*, Hausm.] [*R.A.E.*, A, ix, 185] is apparently established in Pretoria, and it is hoped that its introduction into Natal will eventually be as successful.

Peaches grown with apples in mixed orchards in the Orange Free State are said to suffer more injury from codling moth [*Cydia pomonella*, L.] than the apples.

The Longicorn borer [*Phoracantha semipunctata*, F.] in *Eucalyptus*, introduced from Australia, is reported from various new localities. It is largely spread by unbarked gum poles from infested plantations.

The tobacco crop of the Kat River Valley is estimated at only 10 per cent. of that of 1921 owing to damage by the tobacco slug [*Lema bilineata*, Germ.].

An exceptional abundance of crickets has been reported from Bloemfontein, the species concerned being probably *Brachytrypes membranaceus*, Dru.

A Nematode, *Aphelenchus* sp., is recorded from locally grown chrysanthemums, and the Pyralid, *Leucinodes orbonalis*, Gn., from Cape gooseberry (*Physalis peruviana*) and from *P. minima*.

The Poplar Leaf-beetle, *Melasoma populi*, **attacking Willows.**—*Luxemburger Weinztg., Grevenmacher*, x, no. 11, 3rd June 1922, pp. 118–119.

A copper-lime solution of ¾–1 per cent. strength with the addition of 0·15 per cent. of Urania green is advised as a spray against *Melasoma populi* attacking willows in the Moselle region.

Lehmann (H.). **Die Obstmade.** *Cydia* (*Carpocapsa*) *pomonella*, **L. Heft 1. Ihre Bekämpfung auf wissenschaftlicher Grundlage.** [The Apple Maggot. Part 1. Its Control on a Scientific Basis.]—*Neustadt a. d. Haardt*, Berlet & Cie., 1922, 69 pp., 26 figs.

This is the first of a series of three papers on *Cydia pomonella*, L., and contains an account of the nature of the injury done, the habits of the moth, the measures employed against it in Germany, and advice as to the best combative method. During winter the trees must be cleaned of dead bark, moss, etc., and painted with a fairly thick lime-wash containing 10 per cent. of fruit-tree carbolineum. A powerful arsenical spray, directed so as to penetrate the recesses of the calyx, must be applied immediately the petals fall. One application, properly made, killed 99·01 per cent. of the larvae, and as three sprayings only resulted in 99·42 per cent. killed, their expense is not warranted.

Lankester (C. H.). **Coffee.**—*Uganda Protectorate, Dept. Agric., Kampala*, Circ. 7 [n.d.], 26 pp., 1 plate. [Received 7th June 1922.]

In this report on the coffee cultivation in Uganda, with comparative notes on Costa Rica, a chapter is devoted to the diseases and insect pests occurring in the two countries.

Apparently all pests existing in Costa Rica conjointly cause less loss to the coffee industry than *Antestia lineaticollis* alone does in Uganda. At present the only practicable method of controlling this bug appears to be the encouragement of Hymenopterous parasites and hand-picking; when pruning is resorted to, the thinnings should be burned so as to destroy the eggs. Other pests occurring in Uganda are *Pseudococcus* sp., which attacks the roots, but is not sufficiently injurious to necessitate remedial measures; a moth, *Metadrepana glauca*, causing widespread defoliation, and against which spraying with arsenicals and hand-picking is advised; and *Stephanoderes hampei* (bean borer), which was particularly abundant during 1921. Field control of the latter is very difficult; in the case of slight attack picking and destruction of infested berries is advocated. Many individuals were

found dead, apparently as the result of the sealing by a white fungus of the perforations made by the beetle. This fungus does not belong to the group known to attack insects. *S. hampei* is also parasitised by a small Hymenopteron.

In Costa Rica defoliation on a wide scale, such as is caused by the larvae of *M. glauca* in Uganda, is unknown. A Limacodid and a Saturniid, *Automeris* sp., are the only larvae occurring in any abundance, and they are only of importance in as much as they cause great annoyance to picking gangs owing to their urticating hairs. Defoliation is chiefly caused by ants of the genus *Atta*, which make very large subterranean nests, from which they emerge to attack the coffee trees and also oranges. The usual method of destroying them is to pour half a pint of carbon bisulphide into the nest and explode it by fire, but the results of this treatment, as is the case with ant-destroying machines (which produce gas by the addition of some sulphurous compound to a small charcoal fire), are very uncertain.

The effect of shade on insect and fungous pests is as yet undetermined. *S. hampei* is apparently more abundant in shaded areas, though unshaded coffee is just as liable to attack.

RAMACHANDRA RAO (Y.). **Pests of the Date Palm in 'Iraq.**—*Mesopotamia Dept. Agric., Basrah*, Memoir 6, 1922, 12 pp., 9 figs. [Received 7th June 1922.]

The life-history of the Pyralid, *Batrachedra amydraula*, Meyr., causing the "hashaf" condition of dates in Mesopotamia [*R.A.E.*, A, vii, 189; ix, 91] has been studied and is given in detail. There are apparently two generations in a year. The place of hibernation has not yet been discovered; it is thought that some soft part of the trunk of the palm may be bored into, but cocoons were never found in such situations. The caterpillars disappear after the first week in July, some changing into pupae and emerging as adults a few days later, some hibernating as quiescent larvae. Investigation into the economic importance of this pest has led to the conclusion that dropping of immature dates is caused far more through lack of fertilisation than the presence of *B. amydraula*. It is thought that if a dilute arsenical spray were applied to the bunches about one week after the fruit has set, and again a week or ten days later, many of the larvae would be killed, especially as each larva eats its way into three or four fruits before it reaches maturity. In a few cases, cocoons of a parasite, probably *Habrobracon kitcheneri*, Dudg. & Gough, were observed.

The pest that ranks next in importance is the larva of the Cerambycid, *Pseudophilus testaceus*, Gah., which enters the leaf base and tunnels about, eventually entering the trunk and causing exudations of sap. Pupation occurs in the tunnel, and the adult escapes by making a circular hole in the bark. The life-history occupies a year, and the only remedy that seems at all feasible is the collection of the adults at light traps, to which they may be attracted in June and July. Thorough cleaning of the palm and removal of the leaf bases and fibre in December and again in July, when oviposition is over, should free the tree from grubs. Any affected offshoots about the base of the tree should be pulled out and burnt.

Oryctes elegans, Prell, is said to breed in the tops of living trees; it has been noticed at lights in April and May, and in July bored into the top shoots of palms at the bases of the leaf-stalks and central shoots. The beetles can be hooked out with a stiff wire. A mite,

perhaps a species of *Oligonychus*, appears in large numbers in the dry months of July–September and webs over the bunches, causing much dust to settle on the webs. The mites, working under the webs, lacerate the surface of the fruit when about half-ripe and suck the sap. Dusting with flowers of sulphur as soon as the first symptoms appear is recommended. A Fulgorid bug sucks the sap from the leaves, the first generation hatching in April and May and the second in September. Hibernation occurs in the egg stage. Spraying with a contact insecticide, such as kerosene emulsion or tobacco decoction, is recommended and should be very thoroughly done, as the insects are very active. All unnecessary side-shoots should be cut away and destroyed, as they harbour many eggs.

Coccid pests include *Parlatoria blanchardi*, Targ., found on the leaflets of young palms and offshoots. It is widely distributed in Mesopotamia, but does not become very serious, probably owing to climatic conditions and to the parasite, *Aphelinus mytilaspidis*, Bar. *Phoenicococcus marlatti*, Ckll., is found closely packed in masses between the leaf bases and the stem, but does not cause great damage. Another Coccid pest is *Asterolecanium phoenicis*, Green.

Losses to the date crop may also be caused by the locust, *Schistocerca peregrina*, Ol., by termites, and, in windfall or stored dates, by *Ephestia cautella*, Wlk. The latter are also attacked by the beetles, *Silvanus surinamensis*, L., and *Laemophloeus* sp.; much of this loss may be prevented by exposing the packages of dates periodically to direct sunlight.

DUTT (A.). **Supplementary Note on the Pests of the Date Palm in 'Iraq.**—*Mesopotamia Dept. Agric., Basrah*, Memoir 6, 1922, pp. 13–21. [Received 7th June 1922.]

The damage due to "hashaf" condition was estimated in 1918 to be 70 per cent. of the crop. Investigation has shown the formation of a definite callus at the base of the calyx of all wind-fallen dates, and where there is no insect stimulation to cause this formation, it seems very probable that the insects have nothing to do with the falling of the fruit. It is quite possible that they attack only weak fruit that would in any case fall off, and this would explain the precaution of attaching the dates before they attack them to the stalk of other sound fruit by a silken thread. It was noticed that trees on canals and those that had a good water supply bore better crops and showed but little sign of attack. In spite of the heavy losses in 1918, conditions were normal in the following year. The cause of premature shedding of dates requires further study, and upon this depends the question of remedial measures; the author suggests that cultural methods, such as effective fertilisation and increased water and food supply, would do much towards producing a better crop. Only one generation of *Batrachedra amydraula*, Meyr., was observed, but there may have been a slight infestation by a previous generation that passed unnoticed.

As a remedy for *Pseudophilus testaceus*, Gah., it is suggested that carbon bisulphide should be injected into the holes made by the borer, which should then be plugged with mud. The author questions the possibility of *Oryctes elegans*, Prell, breeding in the top of living palms.

The author considers that the worst disease of dates is that caused by the mite, *Oligonychus* sp. It only thrives in dry weather, and therefore is found chiefly on high lands and near the desert. The

severity of the attack in 1921 was doubtless due to the exceptionally high temperature during the summer. Trees having a good water supply, can withstand the attack to a large extent. When the fruit begins to be soft and mellow the mites leave it and probably remain on the tree among the fibrous growth during the winter. Spraying with kerosene emulsion is suggested in preference to sulphur dusting as being less expensive, and because the mites lodge in rather inaccessible places in the tops of large palms and the underside of bunches of dates. A 10 per cent. emulsion is recommended, to be applied in June or July and again after seven days' interval.

Against the Fulgorid bug, soap solution with tobacco decoction had no effect as an insecticide, but half a pound of ordinary hard soap in one gallon of water, emulsified with two gallons of kerosene, the whole diluted with ten parts of water, readily killed the insects. May and September are the best times for spraying, but where the dates are not harvested by September, May spraying only must be relied upon, as kerosene emulsion is liable to render the ripe fruit unfit for eating.

LUGINBILL (P.). **Bionomics of the Chinch Bug.**— *U.S. Dept. Agric., Washington, D.C.*, Bull. 1016, 31st January 1922, 14 pp., 2 figs. [Received 7th June 1922.]

In South Carolina *Blissus leucopterus*, Say (chinch bug) has six instars besides the egg stage. There are two generations annually, and these overlap to such an extent during the summer that all stages of the insect may be found at once. Adults of the first generation appear in late April, those of the second in September and October, and these latter hibernate. Hibernation occurs chiefly among dead maize-stalks and dead grass, along terraces and borders of fields, the insects being very scattered and feeding but little. In the first warm days the spring migration begins, the adults flying to grain fields. The summer generation consists largely of short-winged forms that are unable to fly, and are compelled to crawl to fresh fields. The life-history of the bug is recorded and the various stages are described. A Tachinid parasite recovered from a male of *B. leucopterus* proved to be *Phorantha occidentis*, Wlk. This seems to be the first record of a Dipterous parasite being reared from this bug; a Chalcid, *Eumicrosoma benefica*, Gah., was reared from the eggs several years ago [*R.A.E.*, A, ii, 383].

CROSSMAN (S. S.). ***Apanteles melanoscelus*, an imported Parasite of the Gipsy Moth.** — *U.S. Dept. Agric., Washington, D.C.*, Bull. 1028, 13th March 1922, 25 pp., 4 plates, 1 fig., 1 map.

Apanteles melanoscelus, Ratz., was introduced into New England about 1911 and has since become firmly established. It is spreading rapidly and increasing in abundance in spite of a number of secondary parasites, which include at least three Ichneumonids as well as numerous Chalcids. This parasite is particularly useful as it is able to complete its life-cycle in several native insects. It has been recorded from *Porthetria dispar*, L., *Stilpnotia salicis*, L., and *Hemerocampa leucostigma*, S. & A. Reproduction is also successful in *Malacosoma americana*, F., *M. disstria*, Hb., *Olene basiflava*, Pack., and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.). Oviposition apparently occurred in *Charidryas nycteis*, D. & H., *Hemileuca maia*, Dru., *Pteronus ribesii*, Scop., and a Tortricid, but there was no evidence of parasitism in any of the larvae except those of *C. nycteis*.

A. melanoscelus hibernates as a third-stage larva within the cocoon. The majority of adults emerge when the hatching of the eggs of *P. dispar* is at its maximum, usually during the second week in May. Reproduction is frequently parthenogenetic. The act of oviposition is described. The adults emerging from the hibernating generation generally parasitise the first- and second-stage larvae and even the third should they be present ; but the next generation of adults, although chiefly parasitising the third stage, will occasionally attempt to oviposit on the fifth- and sixth-stage larvae, though they are usually prevented from doing so by the long hairs present in these stages. The largest number of eggs obtained from one female was 535, but under natural conditions the number is probably about 1,000.

The egg stage lasts from 48–72 hours, according to the temperature. There are three larval stages. The length of these is slightly longer in the summer than in the spring generation. Pupation occurs in a cocoon external to the host and lasts from 5 to 9 days ; the pupae may be found singly or in clusters either on the foliage or on the debris on the ground, as well as on the trunk and small branches. Those of the second generation are scattered over the trunk and in clusters under the larger limbs. They are generally not abundant until about the second week in July.

The introduction and establishment of this parasite into New England are discussed, and the methods of colonisation and distribution are described. The imported parasites were first thought to belong to several species, but it now appears that the adults liberated in June 1911 at North Saugus, Massachusetts, from cocoons imported from Sicily as *A. solitarius*, belonged to the first generation of *A. melanoscelus*, whereas those received later were of the second generation of this species. About 17,000 cocoons were received in July and August 1911, each one of which was placed in a gelatin capsule and allowed to pass the winter under outdoor conditions. All parasites liberated since 1913 have been put out while in the cocoon and have been of the summer-issuing generation, most of the colonies containing 500 cocoons. The cocoons are placed in small cylindrical covered cans, which are nailed to the tree in inconspicuous places. The adults escape through three ¼ in. holes punched in the can near the top. Tree-banding material must be placed right round the can to prevent ants from destroying the colony. Woodland areas with a light to medium gipsy moth infestation are preferable for the liberation of these parasites, and heavily infested areas should be avoided. Owing to the rapid dispersal of the parasite one colony was placed in each town and several large areas have thus become well stocked. Parasites have been recovered from all but one of the colonies liberated before 1918, from half of those put out in 1918 and from both liberated in 1919. Late in the summer of 1920 the parasites were recovered from towns colonised in June of that year.

THORNE (G.) & GIDDINGS (L. A.). **The Sugar-beet Nematode in the Western States.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1248, February 1922, 16 pp., 10 figs.

Heterodera schachtii, Schmidt, is found in many of the principal beet-growing sections of Utah, Idaho, California and Colorado. The results of recent surveys show that the infestation is spreading rapidly in some localities. The life-history, causes of spread and remedial measures are discussed [*R.A.E.*, A, viii, 414]. The most common

means of spreading infestation is from dirt from the beet dumps; care should therefore be taken to prevent scattering of the soil. Co-operative action should at once be adopted when the pest has been found in any locality.

Early planting is of advantage provided irrigation water is available, but where rainfall must be relied upon, the raising of beets on even slightly infested soil would hardly be worth while.

The only cultivated crops found to be injured were cabbage, cauliflower, turnips, table beets and mangels; the pest has also been found on mustard, pigweed and saltweed.

Clean seed and clean culture are essential for good results to be gained by crop rotation. After a short crop rotation, such as one or two years of peas or beans, it is possible to obtain a single good crop of beets, though a second almost invariably fails. Complete eradication of the Nematode, even by a very long crop rotation, is exceedingly difficult, if not impossible.

PHILLIPS (E. F.). **Beekeeping in the Clover Region. Beekeeping in the Buckwheat Region. Beekeeping in the Tulip-tree Region.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bulls. 1215, 1216, & 1222, January & February 1922; 27 pp., 7 figs.; 26 pp., 7 figs.; 25 pp., 6 figs. [Received 7th June 1922.]

Instructions are given in the management of apiaries with a view to obtaining the best honey production under various conditions.

MIDDLETON (W.). **Sawflies injurious to Rose Foliage.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1252, February 1922, 14 pp., 7 figs. [Received 7th June 1922.]

The Tenthredinids dealt with are *Cladius isomerus*, Norton (bristly rose slug), a species native to the United States; *Eriocampoides (Caliroa) aethiops*, F. (European rose slug), occurring in Europe and North America; and *Emphytus cinctipes*, Norton (coiled roseworm), chiefly noted for its habit of boring into the end of pruned shoots, where it passes the resting stage.

The life-history of these sawflies and the damage caused by them are briefly described.

They may be easily controlled by a strong stream of water applied often and from different angles so as to knock the larvae from the leaves; should this treatment not be practicable, a spray of 1 lb. powdered lead arsenate to 50 U.S. gals. water applied with a large compressed air hand-sprayer or barrel pump may be used. One part of 40 per cent. nicotine sulphate to 800 of water, with the addition of some fish-oil or laundry soap, is also effective against the larvae as well as against Aphids. Clean cultivation is important.

HUNTER (W. D.) & COAD (B. R.). **The Boll-weevil Problem.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1262, February 1922, 31 pp., 5 figs. [Received 7th June 1922.]

A general account of the boll-weevil, *Anthonomus grandis*, Boh., in the United States is given. The remedial measures suggested are based largely on cultural methods. Where poisoning is required, calcium arsenate should be used in the manner that has been shown to give good results [*R.A.E.*, A, viii, 457; ix, 373].

Phillips (E. F.). **The Occurrence of Diseases of Adult Bees.**—*U.S. Dept. Agric., Washington, D.C.*, Dept. Circ. 218, March 1922, 16 pp., 2 figs.

An account is given of the Isle of Wight disease of bees, which has not as yet appeared in the United States, and of *Nosema* disease. The most probable means of distribution of the latter is by the importation of living bees. It is thought that the precautions against the introduction of Isle of Wight disease should be adequate to keep out any further cases of *Nosema*, and the present wide distribution of the latter and its mild character would seem to render unnecessary any quarantine measures against it alone.

Morrison (H. & E.). U.S. Bur. Ent. **A Redescription of the Type Species of the Genera of Coccidae based on Species originally described by Maskell.**—*Proc. U.S. Nat. Mus., Washington*, lx, art. 12, no. 2407, pp.1–120, 6 plates. [Received 7th June 1922.]

The contents of this paper are indicated by its title.

Middleton (W.). U.S. Bur. Ent. **Descriptions of some North American Sawfly Larvae.**—*Proc. U.S. Nat. Mus., Washington*, lxi, art. 21, no. 2442, 1922, pp. 1–31, 8 figs. [Received 7th June 1922.]

Descriptions are given of larvae belonging to eight different genera of sawflies obtained during investigations on insects injurious to forest and shade trees and shrubs. The genera represented are briefly characterised, and keys to the larvae described are included, with notes on the life-history and seasonal appearance of the species.

The Supply and Use of Tobacco Products for Insecticidal Purposes. —*Jl. Dept. Agric. & Tech. Instruc. for Ireland, Dublin*, xxii, no. 1, May 1922, pp. 31–34.

Experiments have been in progress since 1910 for the purpose of finding an increased and cheaper supply of nicotine for spraying purposes. The possibility of utilising waste tobacco in the form of offal snuff, which is returned as useless by the manufacturers to the revenue authorities, and is obtainable at a very low figure, has been investigated. It has been found that this material, denatured by mixing it with finely sifted bog mould, made a very successful insecticide, and a Dublin firm has now taken up the preparation and sale of it. The present commercial supply of nicotine consists largely of double-distilled nicotine of 96 per cent. purity. Tobacco extract is equal, if not superior, as an insecticide, to a solution of pure nicotine of corresponding strength. By growing tobacco especially for nicotine, or by denaturing abandoned offal snuff, large supplies for insecticidal and possibly other purposes could be obtained at much below the present rates for nicotine solutions and tobacco powder extracts. The offal tobacco can generally be obtained from the revenue authorities at about 30*s*. per ton for snuff and 20*s*. per ton for stalks. The enormous supplies of tobacco leaf-stalks produced could, if finely ground, be used for spraying purposes in the same manner. The grinding can be done by disintegrating machinery, which is capable of dealing with tobacco stalks, peat moss and even bones. The tobacco, when denatured, is free from Customs and Excise control.

The nicotine content of denatured offal snuff is rather variable, but should average 1½ per cent. from cigarette leaf and 1 per cent. from ground leaf-stalks and heavy dark pipe tobacco. An effective spray can be made by mixing tobacco offal in the proportion of 1 lb. offal to 1½ gals. of water, and allowing the mixture to stand in a cool place for 72 hours, after which it should be very thoroughly strained. Further investigations are being conducted respecting the efficiency of this spray, with special reference to the possibility of extracting the maximum quantity of nicotine from the offal, the optimum degree of dilution and the setting free of the nicotine from chemical combination.

RESTREPO (A. G.). **Sobre una Enfermedad del Cafeto.** [A Disease of Coffee.]—*Rev. Agric., Bogotá,* vi, no. 6, June 1920, pp. 326–327. [Received 7th June 1922.]

In this communication to the Colombian Ministry of Agriculture attention is drawn to the ravages of the coffee berry-borer, *Stephanoderes hampei,* in Java. In San Paulo, Brazil, where in the past shipments of seed have been received from Java, such importation is now prohibited.

Vorsichtsmassregeln zur Verhütung von Unglücksfällen beim Gebrauch von arsenhaltigen Mitteln (Schweinfurter Grün, Uraniagrün usw.) gegen Pflanzenschädlinge, insbesondere gegen den Heu- und Sauerwurm. [Precautionary Measures against Accidents in the Use of Arsenicals against Pests of Plants, especially the Spring and Summer Generations of the Vine-moths.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst, Berlin,* ii, no. 6, 1st June 1922, p. 43.

The use of arsenical poisons in agricultural practice has only recently been adopted in Germany. These rules have been drawn up by the Imperial Ministry of Health and the Imperial Biological Institute for Agriculture and Forestry for the protection of those unfamiliar with such preparations.

FORSIUS (R.). **Ueber einige paläarktische Tenthredinini.** [On some Palaearctic Tenthredininae.]—*Medd. Soc. Fauna et Flora Fennica, Helsingfors,* xliv (1917–1918), 1918, pp. 141–153. [Received 9th June 1922.]

Some of the results of a revision of the author's work on the sawflies of the old world are given. A new subgenus, six new species and nine new varieties are erected.

LINNANIEMI (W. M.). *Aleurodes fragariae* **and** *Trioza alacris.*—*Medd. Soc. Fauna et Flora Fennica, Helsingfors,* xliv (1917–1918), 1918, p. 57. [Received 9th June 1922.]

Aleurodes fragariae was abundant on garden strawberries and the Psyllid, *Trioza alacris,* occurred on laurel in greenhouses. Both species are new records for Finland.

LINNANIEMI (W. M.). *Laemophloeus minutus*, **Oliv.**—*Medd. Soc. Fauna et Flora Fennica, Helsingfors*, xlv (1918–1919), 1920, p. 43. [Received 9th June 1922.]

A sample of maize contained several specimens of *Laemophloeus minutus*, Oliv. This Cucujid has not been recorded previously from Finland and must have been imported with maize from Argentina.

LINNANIEMI (W. M.). *Deltocephalus striatus*, **L.**—*Medd. Soc. Fauna et Flora Fennica, Helsingfors*, xlv (1918–1919), 1920, p. 2. [Received 9th June 1922.]

Deltocephalus striatus, L., which is common in meadows in Finland, devastated the grain crops in some areas in 1918. Wheat and rye were especially attacked, though in some places spring crops, more particularly oats, suffered considerably.

FORSIUS (R.). **Zur Kenntnis einiger Blattwespen und Blattwespen-larven. II.** [A Contribution to the Knowledge of some Sawflies and Sawfly Larvae].—*Medd. Soc. Fauna et Flora Fennica, Helsingfors*, xlvi (1919–1920), 1921, pp. 25–32.

The larva of *Tenthredo vespa*, Retz., which occurs in Finland, though not included in the lists hitherto published by the author, feeds on *Fraxinus*, *Viburnum*, *Lonicera*, etc. *Macrophya rufipes*, L., is another new record. *Entodecta pumilus*, Klg., was noticed ovipositing on *Rubus idaeus*. The larvae of *Pteronidea pseudonotabilis*, Ensl., the larva and hitherto unknown male of which are described, live in groups on smooth-leaved willows, especially *Salix phylicifolia*. The male of *Pontania forsiusi*, Ensl., is described as well as both sexes of *Amauronematus excellens*, sp. n., the larvae of which live on *Salix caprea*.

TAKAHASHI (R.). **Aphididae of Formosa. Part I.**—*Rept. Formosa, Agric. Expt. Sta., Taihoku*, special number, 1921, 97 pp., 14 plates. [Received 6th July 1922.]

This paper is the first report of investigations on the Formosan Aphids, to which little attention has been paid. Of the 99 species recorded 45 are described as new, and some new subtribes and genera are proposed. Keys are given to the tribes, subtribes, genera and species.

The following are described as new :—*Macrosiphum formosanum* on *Sonchus oleraceus* and *Lactuca* spp. ; *M. miscanthi* on *Miscanthus* sp. ; *M. alopecuri* on *Alopecurus* sp. ; *M. paederiae* on *Paederia tomentosa* ; *M. smilacifoliae* on *Smilax chinensis* ; *M. neoartemisiae* on *Artemisia capillaris* ; *Macrosiphoniella formosartemisiae* on *Artemisia capillaris* ; *Myzus polygoniformosanus* on *Polygonum perfoliatus* and *Lonicera japonica* ; *M. woodwardiae* on *Woodwardia* sp. and *Polystichum* sp. ; *M. polypodicola* on a plant belonging to the Polypodiaceae ; *M. arthraxonis* on *Arthraxon ciliaris* ; *M. hemerocallis* on *Hemerocallis fulva* ; *M. formosartemisiae* on *Artemisia vulgaris* ; *Fullawayella formosana* on *Allium scorodoprasum* ; *Rhopalosiphum papaveris* on *Papaver somniferum* ; *Cavariella araliae* on *Aralia spinosa* ; *C. neocaprae* on *Salix* sp ; *Yamataphis papaveris* on *Papaver somniferum* ; *Toxoptera leonuri* on *Leonurus sibiricus* ; *Aphis ficicola* on *Ficus wightiana* ; *A. gossypii*, Glov., var. *callicarpae*, n., on *Callicarpa formosana* ;

A. smilacifoliae on *Smilax chinensis*; *A. droserae* on *Drosera lourerii*; *A. kurosawai* on *Artemisia vulgaris*; *A. formosanus* on *Sorghum vulgare* and other Graminaceae; *A. miscanthi* on *Miscanthus* sp.; *A. shirakii* on *Melastoma candidum*; *Brachycolus heraclei* on *Heracleum* sp. and *Apium graveolens*; *Brachysiphoniella* (g.n.) *gramini*, Tak., on *Leersia hexandra*; *Greenidea quercifoliae* on *Quercus variabilis*; *G. ficicola* on *Ficus retusa* and *F. obscura*; *G. taiwana* on *Meliosma rhoifolia*; *Myzocallis bambusicola* on *Dendrocalamus latiflorus*; *M. pseudoalni* on *Alnus formosana*; *M. querciformosanus* on *Quercus dentata*; *M. bambusifoliae* on *Bambusa* sp.; *Phyllaphoides bambusicola* on *Bambusa* sp.; *Periphyllus formosanus* on *Acer* sp.; *Eulachnus piniformosanus* on *Pinus* sp.; *Aiceona* (g.n.) *actinodaphnis* on *Actinodaphne pedicellata*; *Oregma bambusifolia* on *Bambusa* spp.; *O. bambusicola* on *Bambusa* sp.; *O. panicola* on *Panicum patens*; *Astegopteryx quercicola* on *Quercus variabilis*; *A. styracicola* on *Styrax formosana*; *A. giganteum* on ? *Ficus retusa*.

VUILLET (J.). **La Larve de la Tige du Cotonnier** (*Sphenoptera gossypii*, **Cotes**).—*Bull. Comité Etudes Hist. & Scientif. Afr. Occ. Française, Paris*, 1920, no. 3, July–September 1920, pp. 308–310. [Received 10th June 1922.]

Various records of the Buprestid, *Sphenoptera gossypii*, Cotes, from Western Africa are reviewed, covering the period of 1904 to 1914.

In 1908 it was recorded as *S. angolensis*, Gory, attacking all American cotton and killing the bushes before flowering; native cotton though also attacked was apparently more resistant. It has been suggested that in localities where the natives are in the habit of growing annual and biennial cotton, only the former should be encouraged. The plants should be pulled up and burned immediately after the harvest in the annual plantations, and those dying or drying up before the end of the harvest should be burned as soon as possible. As stated by Andrieu, in 1914, the control of this beetle is very difficult, as it lives equally well on other Malvaceous plants, particularly wild species of *Hibiscus* of the group *H. sabdariffa*, which are widely distributed in the Nigerian bush. Even if this were not the case, the destruction of the plants by fire immediately after the harvest would not be entirely successful, as some of the larvae pupate and develop into adults before that time.

Andrieu suggests the placing of the stumps in screened containers so that the parasites, including the Braconid, *Pseudovipio andrieui*, may escape, but this is not practicable in the case of native growers.

STUMPER (R.). **L'Influence de la Température sur l'Activité des Fourmis.**—*C.R. Soc. Biol., Paris*, lxxxvii, no. 20, 3rd June 1922, pp. 9–10.

The results obtained on the thermic coefficient of certain of the vital activities of ants are briefly discussed. Activity is found to occur only between certain limits of temperature; these are variable according to the species but constant for each species; for example, *Formica rufa* is active only between 46° and 104° F., *Lasius niger* only between 50° and 82°, and *Myrmica rubra* only between 46° and 82°.

Verslag van het Proefstation Midden-Java over het Jaar 1921. [Report for 1921 of the Central Java Experiment Station.]—*Meded. Proefst. Mid.-Java, Salatiga*, no. 37, 1922, 20 pp.

The coffee berry-borer [*Stephanoderes hampei*] occurred on many estates, having been previously noted on one only in the Salatiga district. One planter is testing the effect of smearing the berries with an adhesive with the object of killing borers within them and of capturing individuals seeking to attack healthy ones.

KRAUSSE (A.). **Die Rammelkammer des grossen Waldgärtners** (*Blastophagus piniperda*). [The Mating Chamber of *Myelophilus piniperda*.]—*Zeitschr. Forst- u. Jagdwesen*, liv, 1922, pp. 28–30, 2 figs. (Abstract in *Neuheiten a. d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 1, p. 5.)

Myelophilus (*Blastophagus*) *piniperda* does not always mate in the open. The mating chambers, which are best seen in mines made in March and April and lie partly in the bark and partly in the sapwood, are described.

KÖNIG (H.). **Die Nonne, ein Obstbaumschädling.** [The Nun Moth, a Pest of Fruit-trees.]—*Wiener landw. Zeitg.*, lxxi, 1921, p. 409. (Abstract in *Neuheiten a. d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 1, p. 6.)

It is reported from Bohemia that the nun moth [*Liparis monacha*] has attacked fruit-trees to such an extent that the defoliated branches died. Apples suffered most, pears less, while plums escaped. Larvae placed on plum trees migrated to others.

SEITNER (M.). **Der Kiefernspanner in Galizien, 1915–1917, eine Tafel.** [*Bupalus piniarius* in Galicia in 1915–17.]—*Centralbl. für d. ges. Forstwesen, Vienna*, xlvii, 1921, pp. 198–213. (Abstract in *Neuheiten a. d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 1, p. 6.)

During the outbreak of the pine moth, *Bupalus piniarius*, in Galicia in 1915–17, trees in high situations suffered most from defoliation. Up to 1,000 caterpillars were counted on one trunk. Artificial measures were hopeless. The author studied the following parasites:—*Heteropelma calcarator*, Wesm., *Ichneumon nigritarius*, Gr., *Lydella nigripes*, Fall., *Parexoristes rutila*, Rond., and, more particularly, *Anomalon biguttatum*, Gr., which was a factor in checking the infestation. Development in this Ichneumonid only requires 8–10 days, a constant degree of moisture being necessary. In the winter of 1916–17 27 per cent. of the pupae were infected with a fungus, *Botrytis bassiana*. The pupal stage lasts 2–3 weeks.

RAMBOUSEK (Fr.) & STRANŇÁK (Fr.). **Příspěvek k studiu můry osenní** (*Agrotis segetum*). [A Contribution to the Study of *Euxoa segetum*.]—*Zeměd. archiv v. Praze*, 1920, pp. 24–34, illustr. (Abstract in *Neuheiten a. d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 1, pp. 6–7.)

Euxoa (*Agrotis*) *segetum* is a dangerous pest of sugar-beet in Czecho-Slovakia. It is favoured by heat in summer and autumn. Its natural enemies include a fungus, *Tarichium megaspermum*, which

is highly infectious; *Anomalon cerinops*, Gr.; *Amblyteles vadatorius*, Ill.; *Amicroplus* (*Macrocentrus*) *collaris*, Spin.; and the flies, *Sarcophaga carnaria*, L., *Pseudogonia hebes*, Fall., *Phryxe vulgaris*, Fall., and *Gonia divisa*, Mg. Birds, bats, moles and toads also destroy this moth. In 1917 sugar-beet was very severely attacked, and in the worst cases all the plants were destroyed in 10–30 days. Such varieties of potatoes as have tubers with a loose tissue, a large water content, and a small degree of acidity, are attacked up to 60–100 per cent. *E. segetum* avoids light and wet soils, and ground manured with sulphate of ammonia, Chile saltpetre or kainit. The measures advised include suitable manuring, clean cultivation, harrowing, rolling, the making of trenches (6–8 in. deep and containing slaked lime with 10 per cent. of calcium chloride), collection of the larvae (of which living individuals only should be fed to poultry), and strewing infested plots with a dust obtained by crushing larvae killed by *Tarichium megaspermum*. Fires on still nights in May or September will attract the moths, 20–30 per cent. being females.

KAVEN (—). **Einige im Frühjahre auftretende Rosenschädlinge.** [Some Rose Pests occurring in Spring.]—*Förderer im Obst- u. Gartenbau*, iii, nos. 21 & 25–31. (Abstract in *Neuheiten a. d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 1, pp. 7–8.)

Rosebuds are attacked by the caterpillars of *Coleophora gryphipennella*, Bch., which pupate in May. The adults emerge in June and oviposit in the eyes of the rose shoots. The larvae remain on the bush and hibernate on it in cases, which may be collected in winter, especially on the root collar. Painting with calcium sulphide and sprinkling lime on the ground are additional measures. The rose scale, *Diaspis rosae*, Bch., may be combated by spraying in spring and by removing and burning the infested twigs. *Tortrix bergmanniana*, L., and similar pests may be dealt with by crushing the caterpillars within the curled leaves. The larvae of *T. bergmanniana* appear at the end of April and pupate in May. *Eucosma* (*Grapholitha*) *roborana*, Tr., hibernates in the egg stage, and the young larvae feed in April and May between the leaves, which are spun together, and pupate there, the adult emerging after a pupal period of three weeks. The eggs may be brushed off or sprayed, or the larvae crushed in the leaves. Homoptera on roses require spraying or capture on sticky surfaces. Cutting back will dispose of eggs on the twigs, while the bush may be painted with lime to which blood and soap have been added. To protect the plants against the boring larvae of *Otiorrhynchus*, banding and shelter-traps of leaves or moss are recommended. When dealing with the sawfly, *Emphytus cinctus*, L., care must be taken when cutting back not to leave stumps. *Pamphilius* (*Lyda*) *inanitus*, Villers, is combated by keeping the ground clean and loose and by collecting the curled leaves. The rose beetle, *Cetonia aurata*, L., which is not a true pest, may be collected, jarred off, or attracted by a bait of dilute vinegar.

Jaarboek van het Departement van Landbouw, Nijverheid en Handel in Nederlandsch-Indië 1920. [Year-book of the Department of Agriculture, Industry and Commerce in the Dutch East Indies, 1920.]—*Batavia*, 1922, 248 pp. Price 3.50 florins. [Received 12th June 1922.]

This information relating to insect pests has already been noticed from the reports of the various experiment stations, etc.

KIEFFER (N.). **Ueber Heu- und Sauerwurmbekämpfung mittels Pyrethrum.** [On combating the First and Second Generations of Vine-moths with Pyrethrum.]—*Luxemburger Weinztg., Grevenmacher*, x, nos. 7–8, 8th–22nd April 1922, pp. 60–63, 75–78.

Attention is drawn to the increasing cultivation of *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* in Spain, southern France and Switzerland in view of its value against the vine-moths [*Clysia ambiguella* and *Polychrosis botrana*]. In Switzerland, especially, great advances have been made since 1916 in this application of its insecticidal properties, largely due to the work of Dr. Faes [*R.A.E.*, A, x, 231, etc.]. The results obtained by the latter and by French workers are given, and it is suggested that an attempt be made to grow the plant in Luxemburg.

PAOLI (G.). **Il Parassita della Bianca-rossa degli Agrumi e la sua Introduzione in Italia.** [The Parasite of the Citrus Scale and its Introduction into Italy.]—Reprint from *Il Coltivatore, Casale Monferrato*, no. 15, 30th May 1922, 7 pp., 2 figs.

It has been decided to import from Madeira *Aspidiotiphagus lounsburyi*, a parasite which there helps in checking *Chrysomphalus dictyospermi*, the citrus scale that is so injurious in Sicily, on the Italian Riviera, and in other citrus-growing regions of Italy. The author collected parasitised material in Madeira in March 1922, and this has been placed in plantations in Sicily and on the Riviera, some being retained in the laboratory. It is too early to decide whether acclimatisation will be successful, but hundreds of parasites have emerged from the imported material. Large numbers of the scale are destroyed by the plants casting their leaves in spring, but this will not effect such individuals of *A. lounsburyi* as may be infesting the scales.

CORBETT (G. H.) & YUSOPE (M.). **Preliminary Notes on the "Kadondong" Beetle,** *Podontia 14-punctata*, **Linn.**—*Agric. Bull. F.M.S., Kuala Lumpur*, ix, no. 3, July–September 1921, pp. 192–200, 1 plate. [Received 13th June 1922.]

The beetle, *Podontia quatuordecimpunctata*, L., was reported in March 1920 as damaging the Otaheite apple or kadondong (*Spondias dulcis*) in Kuala Lumpur, all the leaves having been eaten off some of the trees. The eggs are laid in batches averaging 36 on the lower surface of the leaves, generally near the tips. The young larvae skeletonise the leaves for the first few days and afterwards migrate to different parts of the plant, eating what is left of the leaves, and depositing their excreta on their bodies as a protection against enemies. When full-grown they construct cocoons of earth and pupate at a depth of 2–6 in. in the soil. The egg stage averages 6·62 days, the larval 13·70 days and the pupal 22·35 days, the average life-cycle thus requiring 42·67 days. Both beetles and larvae feed by day or night, generally on the lower surface of the leaf, and avoid sunlight.

The only parasite that has been obtained is an unidentified Chalcid parasitic on the egg. This insect is capable of ovipositing in its host three hours after emergence. In captivity the parasite lives about nine days. Only one parasite, as a rule, emerges from one egg of the beetle.

While the beetles and grubs are feeding on the leaves a spray of 2 lb. lead arsenate to 50 gals. water is sufficient practically to exterminate

them, and two further applications at intervals of nine days will kill any larvae that have hatched since and any beetles that have emerged from the ground. The spraying should be done in late afternoon or scorching may result. The egg-masses should be collected and placed in a tray surrounded by water or oil so that the grubs are unable to escape, while any adult parasites that emerge can fly away. Cultivation of the soil under infested trees destroys many pupae. Numbers of the beetles can be collected by shaking them on to sheets spread under the trees. In slight infestations collection of the eggs, grubs and beetles is sufficient.

THEOBALD (F. V.). **The Woolly Aphid of the Apple and Elm** (*Eriosoma lanigerum*, **Hausmann**). **Part II. Treatment.**—Separate from *Jl. of Pomology* [*sine loco*], ii, no. 3 [n.d.], 7 pp. [Received 14th June 1922.]

It has been shown in a previous paper [*R.A.E.*, A, ix, 230] that infestation of apple trees by *Eriosoma lanigerum* (woolly aphis) goes on year after year between the root system and the stem, and that there is a migration from the over-wintering Aphids on elms. Infestation cannot be eradicated until the root form is exterminated and until the Aphids are killed when away from the elms, so that sexual reproduction in its major aspect is stopped. Evidence shows that the only way to get rid of the root form is by the use of either immune or resistant stock, and spraying should then be done to prevent the return migrants flying back from the apple to the elm. The cultivation of resistant stock, so successfully practised in America, does not appeal to growers in England, but it is suggested that one of the experimental stations would do well to consider the matter. The relative resistance of various varieties of apple is discussed. Root treatment involves soil injections or the use of soil powder fumigants. Carbon bisulphide is the best fumigant, but owing to the Aphids occurring anywhere from ground level to two feet deep the number of operations necessary renders this method too costly, and even when employed it leaves many living Aphids on the roots. Several patent soil fumigants in solid form were tried without success. Grease-banding the trees to stop infection by the ascending root form has reduced the numbers considerably. Various sprays and washes have been used with more or less success. Paraffin emulsion or paraffin jelly will kill up to 50 per cent. of the insects when there is much woolly covering, and up to 60 per cent. when it is light. These sprays must be applied with force, and the results are not sufficient to encourage their general use. A wash made of 3 gals. of paraffin, emulsified with 8–10 lb. soft soap in 100 gals. water, with the addition of ½ lb. nicotine (96 per cent.), has given as high as 70 per cent. mortality, while 1 oz. of the nicotine to 4 oz. soft soap in 10 gals. of water has destroyed as many as 90 per cent. of the Aphids. The cost of nicotine, however, presents a serious difficulty. Caustic alkali washes used in the winter have been found quite useless. Several of the patent tobacco and nicotine washes proved to be excellent killers, especially those made from tobacco waste. Nicotine sulphate, in the form known as Black-leaf 40, has been found fully as effective as pure nicotine, and costs only half as much. One ounce of this, with 4 oz. soft soap and 10 gals. of water was very effective not only against *E. lanigerum*, but also against the case-bearer of the apple and plum (*Coleophora* sp.), and gives greater success than paraffin-nicotine-soap

wash against the aerial forms. The advantage of nicotine or nicotine sulphate with soap is that it can be applied as a fine spray with very much less pressure than the other washes. In order to destroy both the ascending root forms and the migrants from the elms, spraying should be done at the end of July or in August and not later than the second week in September.

Dust spraying, which has given considerable success in America, has not been tried to any extent in this country. The only experiment on a large scale against *E. lanigerum* was with the patent substance known as Belumnite; its killing power on both Aphids and caterpillars was good, and nearly equal to that of nicotine or nicotine sulphate, water and soap.

It is of the utmost importance that young stock should be disinfected before planting; this can be done by fumigation, using for every 100 cu. ft. of space ½ oz. of sodium cyanide, and for each liquid oz. of cyanide, 1 liquid oz. of sulphuric acid, previously gradually diluted with 4 oz. of water, the stock being left in the fumes for at least two hours. It is said that immersion of young stock in petrol kills all woolly Aphids without injury to the trees, while other oils prove fatal to them. Immersion in paraffin jelly proved fatal, but in soft soap and nicotine the root and stem forms were destroyed without harm to the trees. By the fumigation method, however, eggs of the mussel scale [*Lepidosaphes ulmi*] and all other insects were destroyed at the same time.

THEOBALD (F. V.). **The Aphides attacking the Potato.**—*S.E. Agric. Coll., Wye* (Advisory & Res. Dept.), 1922, 12 pp., 9 figs. Price 1s.

A study of the Aphids occurring on potatoes in Britain has been made with a view to determining the species that carry the virus of mosaic and curly-leaf diseases. Descriptions are given of the four common species occurring on potato foliage and tubers, viz., *Macrosiphum solanifolii*, Ashm., found on potatoes, roses and many other plants, and wintering as ova on roses and as ova and apterae on potato tubers and sprouts and probably on other plants. Though common on potato haulms, it has only once been received from potato seed. This species is probably Kaltenbach's *solani*, but it is thought advisable to retain Ashmead's name for the present. *Myzus persicae*, Sulz. (*Aphis dianthi*, Schr., *vulgaris*, Kyber, *vastator*, Smee, *persicaecola*, Boisd., *persicophila*, Rond., *malvae*, Oestl., and *tuberoscellae*, Theo.) occurs on almost any plant except conifers and forest trees, and commonly on potato haulms and seed. Normally, eggs are laid in autumn on peaches, nectarines, *Daphne*, *Brassica*, and on potato tubers, and may hatch as early as January, potato sprouts often being destroyed by it. It is found nearly all the year round. *M. pseudosolani*, sp. n. (*solani*, Theo., nec Kalt.) is found only on potatoes and is especially abundant on seed potatoes from January to April, occurring also on the bine from August to October. *A. solanina*, Pass., is found not very numerously in the apterous stage under leaves. This species does not readily fall on sweeping the bine. *A. rumicis*, F., is found at times on the bine, but seems to be only a casual pest. A description is given of the subterranean species, *Geoica* (*Tychea*) *phaseoli*, Pass., usually found on the roots of French and runner beans, and occasionally found on potato roots. It is widespread in Britain, but is not considered a serious potato pest.

Other British Aphids that are casual pests are *Macrosiphum lactucae*, L., *M. sonchi*, L., and *A. gossypii*, Glover. The only other Aphids recorded from species of *Solanum* in various parts of the world are *A. solanella*, Theo., *A. nerii*, Kalt, *A. silybi*, Pass., *Macrosiphum tabaci*, Perg., *Megoura solani*, Thomas, and *Trifidaphis radicicola*, Essig.

CENDAÑA (S. M.). **The Banana Weevil.**—*Philippine Agric., Los Baños*, x, no. 8, March 1922, pp. 367-376, 3 plates.

Various records of *Cosmopolites sordidus*, Germ. (banana weevil) since its first description in 1824 up to 1920 are reviewed. In the Philippines the beetle is also a serious pest of abaca (*Musa textilis*). Its habits and the injury caused by it are described. Natural enemies appear to be absent, although a Chalcid has been found in one of the breeding cages when the insects were confined in the insectary. The medium and small varieties of banana are apparently more subject to attack than the larger ones. It is possible that bananas may prove useful as a trap crop for the protection of abaca, but this point requires further investigation. Under laboratory conditions the life-cycle from egg to adult varies from 52-56 days, the length of the larval stage being from 42-45 days. There are probably not more than five generations a year.

Infestation is spread chiefly by the transportation of infested suckers and root stocks; to avoid this they should be soaked in water for at least 72 hours. Clean cultivation and crop rotation should be practised; very old plantations should be cut down and the land ploughed up.

JOHNSTON (T. H.). **Report on Investigations regarding Prickly-Pear Control by Biological Means.**—*Queensland Agric. Jl., Brisbane*, xvii, no. 5, May 1922, pp. 238-240.

The governments of the Commonwealth, Queensland and New South Wales have co-operated in a scheme of investigations with a view to controlling prickly-pear by means of natural enemies. Of eight species of fungi experimented with, only one, *Gloeosporium lunatum*, promises to be of any real value, but it has not yet been tried in the field. A bacterial disease was discovered in Florida in 1920, and the organism causing it has proved to be capable of giving rise to a very virulent disease among all kinds of prickly-pear naturalised in Queensland and New South Wales. Its dissemination, however, depends upon inoculation of each joint, and it is hoped that certain insect enemies of cacti will be of use in carrying the disease in this manner. There are three species of moths that show promise of usefulness in this respect; two of these are borers (*Melitara* spp.), of which one, from Florida, has as yet failed to become established, while the other, from Texas, is doing excellent work, and is capable of attacking and destroying all the various kinds of prickly-pears now naturalised in Australia, though apparently preferring the two commonest. The newly hatched larvae begin the destruction and continue for about three months, when they pupate, the adults emerging about one month later. A bacterial disease kills many of the caterpillars. The other useful moth is *Mimorista* sp., which in its larval stage rapidly destroys the young joints of prickly-pear. The wounds caused by these enemies are frequently invaded by scavenger flies; but though numbers of Stratiomyiids, Syrphids, and others have been bred out in Brisbane from material received from abroad, none has become established. Further attempts are being made to introduce them from North America.

Of many insect enemies of cactus introduced from America, several, including weevils (*Gerstaeckeria* spp.), a bug (*Narnia*), and a midge (*Asphondylia*), have proved to be of little value. Others, such as certain kinds of cochineal insects (*Dactylopius*), have been found to prefer certain kinds of prickly-pear, and one at least is expected to prove quite useful, though its effects are slow. Four species of *Chelinidea* have been introduced, and these Coreids should help in retarding the growth of prickly-pear. The Longicorns, *Moneilema* spp., devour the plants, both in the larval and adult stages, but breed slowly. It is hoped that in time, and particularly if the moths mentioned breed sufficiently rapidly, the prickly-pear may be completely controlled by these natural means.

FROGGATT (J. L.). **Banana Beetle Borer.**—*Queensland Agric. Jl., Brisbane*, xvii, no. 5, May 1922, pp. 240–242, 2 figs.

An account is given of the banana beetle borer [*Cosmopolites sordidus*] in Queensland, and attention is called to the necessity of co-operation among banana growers to cope with it. A series of tests is being carried out on poisoning; from laboratory results these appear satisfactory as a means of destroying the weevils, though field tests have not yet been made. Meantime, corm baits to attract the beetles are recommended, and the method of using these is described [*cf. R.A.E.*, A, x, 233].

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl., Brisbane*, xvii, no. 5, May 1922, pp. 246–247.

Investigation into the occurrence of the fruit-fly, *Dacus ferrugineus* (*tryoni*), in the Granite Belt has revealed the presence of this pest in every district visited. It is active for about six months, appearing with the earliest fruit and disappearing when the last is over. Peaches and nectarines, as well as many pomaceous fruits, are found to harbour the larvae. No wild fruits suitable for development of the pest have been found in this region. The number of eggs laid in individual punctures varied from four to eight, and as many as 40 larvae have been found in one peach. Pupae have been observed a little below the surface of the ground under fruit-trees and also within or projecting from apples. One individual only of *D. ferrugineus* var. *solani* was met with.

Two species of Carabids are predacious on *D. ferrugineus*; the parasite, *Opius tryoni*, has not as yet been met with. The only practical remedial measure at present is the removal of all infested fruit, both on the ground and on the trees, and its immediate destruction, preferably by boiling. Of 80 individuals of *D. ferrugineus* captured in a bait-trap, about 25 per cent. were males.

Maggots very similar to those of *D. ferrugineus* have been found in tomato; these may prove to be larvae of the tomato-fly, *Lonchaea splendida*.

HOUGH (W. S.). **Observations on two Mealy Bugs, *Trionymus trifolii*, Forbes, and *Pseudococcus maritimus*, Ehrh. (Hom., Coccidae).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 6, June 1922, pp. 171–176.

A brief description is given of *Trionymus trifolii*, Forbes, adults of which were placed on roots of small clover plants transplanted into straight vials for the purpose of the present observations. Young

were produced one month after the adults had been brought from the field, the total for two individuals being 131 in 23 days and 162 in 17 days respectively. Within a few hours to a day after the appearance of the larvae they migrate to the stems and leaves and begin feeding; after about another fortnight they migrate to the upper roots and thence to the crown and beneath the bracts around the base of the stem.

Adults were common in October on two-year old and older clover roots, but not the larvae. They were always attended by ants, *Lasius niger*, L., var. *americanus*, Emery, which made tunnels along all the roots on which *T. trifolii* was feeding. During the winter the adults are placed by the ants in specially constructed chambers, and in the spring they are replaced on the roots. The profuse honey-dew excreted by these Coccids is one of the chief foods of the ants. Coccids left on dying plants unattended by ants died, whereas those attended by ants were removed to living roots.

Davis (1894) considered *T. trifolii* to have two forms, a winter and a summer one, but the latter appears to be *Pseudococcus maritimus*, Ehrh.

The characters distinguishing the two species are given. *P. maritimus*, although found associated with *T. trifolii* on the roots of clover, is rarely carried about by ants. This species has been recorded from 80 food-plants, and there are undoubtedly many others. In the Shenandoah valley of Virginia it is more abundant on clover than *T. trifolii*, but in Central Ohio the latter is more numerous. Eggs transferred from sycamore to clover were reared in the insectary with the temperature varying from 45 to 90° F. The complete life-cycle of six individuals averaged 85·5 days from egg to egg. Winter is passed in every stage, the development of which is only retarded. *P. maritimus* produces less honey-dew than *T. trifolii*.

Cosens (A.). **Reports on Insects for the Year: Division no. 3, Toronto District.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 12-13. [Received 15th June 1922.]

Owing to the activities of parasites, assisted by spraying operations and the collection of egg-masses, the tussock moth [*Hemerocampa* sp.] is decreasing in numbers. The Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has been more than usually attacked by the soldier bug [*Podisus*]. *Lebia grandis* also kills a large number of the pest, feeding on all its stages. Other beneficial insects recorded are *Calosoma scrutator* and *C. calidum*, which destroy a large number of noxious insects, including tent caterpillars and cutworms. The most serious pests of the year were the Hessian fly [*Mayetiola destructor*, Say] and the European corn-borer [*Pyrausta nubilalis*, Hb.].

Morris (F. J. A.). **Reports on Insects for the Year: Division no. 4, Peterborough District.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 13–14. [Received 15th June 1922.]

The insects recorded for the year include: *Psenocerus supernotatus* and *Saperda puncticollis* on Virginia creeper; *Leptura octonotata* feeding on blossoms of maple-leaved *Viburnum*; *Eupristocerus cogitans* on alder; *Typocerus lugubris* and *Leptura zebra* on oak; *Chrysobothris harrisi* on pine brush; and *Leptura plebeja* on New Jersey tea.

CAESAR (L.). **Notes on Leaf Bugs (Miridae) attacking Fruit Trees in Ontario.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 14-16. [Received 15th June 1922.]

The Capsid bugs occurring in Ontario include *Heterocordylus malinus, Lygidea mendax, Neurocolpus nubilus, Paracalocoris colon, Campylomma verbasci, Lygus communis* and *L. quercalbae.*

The majority of these, including *L. communis,* occur on apple and pear, though a large percentage of the apples appear to outgrow the injury from it. *L. quercalbae* caused serious damage to peaches in one case; it apparently bred on white oak trees in the neighbourhood of the orchard, and it is thought possible that it also breeds on red oak. *L. caryae* has been reported as injuring peaches in New York.

Camptobrochis borealis was generally present to about the same extent as *L. communis,* but it has not yet been proved whether it feeds on apples. It has been recorded as feeding on Aphids, and when they are not present it will subsist on sap from apple trees.

MITCHENER (A. V.). **The Manitoba Grasshopper Campaign of 1920.** —*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 16-19. [Received 15th June 1922.]

The chief species causing injury in Manitoba are *Camnula pellucida, Melanoplus atlantis, M. femur-rubrum* and *M. bivittatus.* During the campaign of 1920, a special machine for mixing bait was devised [*R.A.E.*, A, ix, 259]. The poisoning operations lasted from the end of May to 23rd July. An average of 1,035 dead grasshoppers was counted to the square yard. It is estimated that every pound spent on baits saved crops to the value of £110.

CRIDDLE (N.). **Some Phases of the present Locust Outbreak in Manitoba.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 19-23. [Received 15th June 1922.]

The egg-laying habits of *Melanoplus atlantis* and *Camnula pellucida* (roadside locust) are compared [*R.A.E.*, A, ix, 126].

Many factors are involved in their natural control; dryness favours their increase, but eggs exposed to the sun in April and May were nearly all destroyed; cold has apparently no effect on them. Contrary to expectations, *Sarcophaga kellyi,* being less abundant in 1920 than in 1919, did not prove of great importance in their control. The fungous disease, *Empusa grylli,* occurred in restricted areas. Mites (*Trombidium* sp.), though occurring in abundance on *M. atlantis,* do not seem to produce much effect on the adults, though they destroy a large number of the eggs. *C. pellucida* in all stages escaped almost entirely. The chief enemies of the locusts are blister beetles and the Syrphid, *Systoechus vulgaris.* During 1920, *Microbasis unicolor* var. *murina* and *Cantharis sphaericollis* were the more important blister beetles; the former is a pest of the plants of the pea family and potato, while the latter feeds on prairie snowberry (*Symphoricarpus occidentalis*) and cultivated honeysuckle; others recorded were *Epicauta sericans* feeding on *Anemone* and lambsquarters [*Chenopodium*], and *Cantharis nuttalli* feeding on members of the pea family and *Caragana.* The larvae of these beetles apparently destroy the locust eggs. A Hymenopterous parasite reared from the eggs is probably that described as *Scelio luggeri,* Riley, which emerges just about the time the locusts are ovipositing.

BUCKELL (E. R.). **The Influence of Locusts on the Ranges of British Columbia.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 23–29. [Received 15th June 1922.]

The bulk of this information has been noticed elsewhere [*R.A.E.*, A, ix, 489, 603].

STRICKLAND (E. H.). **The Invasion of Southern Alberta by Beet Webworms.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 29–31. [Received 15th June 1922.]

During the autumn of 1919 the second generation of *Loxostege sticticalis*, L. (beet webworm) was unusually abundant in several districts of Southern Alberta. The numbers in 1920 exceeded those of previous years, but in spite of the inconvenience caused by the migration of the larvae into houses, etc., it is considered that their activities have been of financial benefit to the State [cf. *R.A.E.*, A, viii, 193].

A few individuals of the parasite *Meteorus loxostegis* were bred from cocoons turned up from weedy stubble in the spring of 1920.

HUDSON (H. F.). **The Present Status of the Hessian Fly in Western Ontario.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 32–34. [Received 15th June 1922.]

The financial loss due to the Hessian fly [*Mayetiola destructor*, Say] in Western Ontario during 1920 is difficult to estimate; in some cases the entire crop was destroyed, while a few infested fields averaged about ten bushels of grain per acre. No wheat should be sown in August, the best results being obtained with wheat sown in well-manured land in October. The flies had practically all emerged by 21st May, and none of them was observed on the wing after 25th May. A brief outline is given of the life-history.

Parasites cannot apparently be relied upon for the control of this pest. All self-sown wheat should be destroyed and infested stubble ploughed under as soon after the harvest as possible. Co-operation of farmers with regard to the date of sowing is essential for the best results.

HUDSON (H. F.). **Insects of the Season 1920.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 34–35. [Received 15th June 1922.]

The more important insect pests recorded during the year included: *Pyrausta nubilalis* (European corn-borer), which might be materially reduced by the destruction of such plants as ragweed (*Artemisia trifida*) and barn-yard grass (*Panicum crusgalli*); *Agriotes mancus* (wheat wireworm); *Diabrotica vittata* (cucumber beetle), against which one application of dust consisting of 20 lb. hydrated lime and 1 lb. Paris green appeared sufficient; seed corn maggot [*Hylemyia cilicrura*], recorded for the first time as causing injury in Western Ontario; cabbage worm [*Pieris rapae*], unusually abundant; and *Depressaria heracleana* (parsnip webworm), also very abundant.

CAESAR (L.) & ROSS (W. A.). **Insects of the Season in Ontario.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 35–43, 3 figs. [Received 15th June 1922.]

In addition to the insects already mentioned in the preceding papers, the following were recorded as orchard pests: *Cydia pomonella* (codling moth), less abundant than in the previous year; *Aspidiotus perniciosus* (San José scale), increasing in neglected orchards, but heavily parasitised in certain localities by Chalcids; *Lepidosaphes ulmi* (oyster-shell scale), greatly increasing in many orchards; *Tortrix argyrospila* (fruit-tree leaf-roller); *Alsophila pometaria* (fall canker-worm), increasing rapidly in certain counties; *Empoa rosae* (rose leaf-hopper), more abundant than usual on apples; *Rhagoletis pomonella* (apple maggot), reported from two counties not previously infested; a Scarabaeid, probably *Hoplia trifasciata*, attacking blossoms of apple trees; *Coleophora malivorella* (pistol case-bearer), prevalent on apple foliage; *Psylla pyricola* (pear psylla), unusually abundant in some districts; *Eriocampoides limacina* (pear and cherry slug); *Aegeria* (*Sanninoidea*) *exitiosa* (peach tree borer), causing more injury than usual; *Scolytus* (*Eccoptogaster*) *rugulosus* (fruit-tree bark-beetle) injuring peach trees; *Macrodactylus subspinosus* (rose chafer) occurring locally on grapes, peaches, apples, etc.; *Myzus cerasi* (black cherry aphis) injurious to sweet cherries; *Tetranychus pilosus* (plum spider mite) heavily infesting plum trees; and *Hyalopterus arundinis* (mealy plum aphis).

The insects attacking grapes and small fruits included: *Metallus bethunei* (blackberry leaf-miner); *Anthonomus signatus* (strawberry weevil); *Systena frontalis* (red-headed flea-beetle); *Typophorus canellus* (strawberry root worm); *Janus integer* (currant stem-girdler); *Monophadnus rubi* (raspberry sawfly); *Typhlocyba comes* (grape leaf-hopper); and *Diaspis* (*Aulacaspis*) *rosae* (rose scale) and *Oecanthus nigricornis* (tree-cricket) on raspberry canes.

The vegetable pests included: *Thrips tabaci* (onion thrips), not injurious owing to weather conditions; *Myzus persicae* on potatoes, controlled by spraying with Black-leaf 40 and Bordeaux mixture; *Acyrthosiphon* (*Macrosiphum*) *pisi*; *Papaipema nitela* on maize and potatoes; *P. cataphracta* on maize and cultivated asters; *Melanotus* sp. boring in tomato stems; *Crioceris asparagi* and *C. duodecimpunctata* (asparagus beetles); *Empoasca mali* (potato leaf-hopper); *Systena taeniata*, prevalent on tomatos, potatoes, beans, egg-plants, peppers and asters; and *Epitrix cucumeris* (potato flea-beetle) on tomato.

Insects injurious to field crops were: *Anaphothrips striatus* on oats; *Meromyza americana* (greater wheat-stem maggot), destroying spring wheat; *Blissus leucopterus* (chinch bug), greatly reduced by the rains of the previous autumn; and *Eriopeltis festucae* (cottony grass scale).

Greenhouse pests were: *Diarthronomyia hypogaea* (chrysanthemum midge); *Neocerata* (*Dasyneura*) *rhodophaga* (rose midge); *Tarsonemus pallidus* (cyclamen mite); *Emphytus cinctipes* (curled rose slug); *Lygus pratensis* (tarnished plant bug) on *Aster*; and *Phlyctaenia ferrugalis* (greenhouse leaf-tyer) on *Chrysanthemum* and other plants.

Insects injuring forest and shade trees and shrubs were: *Bucculatrix canadensisella* (birch leaf skeletoniser), *Tetranychus bicolor*, *Aphis viburnicola* and *A. rumicis*.

FELT (E. P.). **Some of the Broader Aspects of Insect Control.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 43–49. [Received 15th June 1922.]

The importance of the various phases of insect control, particularly with reference to large scale repressive work, is discussed, and it is pointed out that the magnitude of the problem should not preclude attempts at its solution.

CAESAR (L.). **Further Data on** *Phorbia brassicae*.
TREHERNE (R. C.) & RUHMAN (M. H.). **The Control of the Cabbage Root Maggot in British Columbia.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 50–51 & 51–53. [Received 15th June 1922.]

The bulk of the information in these two papers has been noticed elsewhere [*R.A.E.*, A, ix, 127, 372]. The experiments carried out in 1920 with mercury bichloride on a commercial scale leave no doubt as to the efficacy of the treatment for such purposes.

ROSS (W. A.). **Notes on the Control of the Rose Midge.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 63-66. [Received 15th June 1922.]

This information has been taken from a previous paper [*R.A.E.*, A, vii, 211].

MAHEUX (G.). **Report on Injurious Insects in Quebec District for 1920.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto*, 1921, pp. 70-72. [Received 15th June 1922.]

Most of this information has already been noticed [*R.A.E.*, A, x, 321]. Other pests recorded include *Macrobasis unicolor*, Kirby, on potato plants; *Smynthurus hortensis*, Fitch, on beans; and *Phenacoccus acericola*, King, on sugar maple.

HORTON (J. R.) & SATTERTHWAIT (A. F.). **The Chinch Bug and its Control.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1223, February 1922, 35 pp., 14 figs. [Received 15th June 1922.]

The three chief methods of destroying chinch bugs (*Blissus leucopterus*, Say) are the burning or ploughing of their hibernating places, which are found in bluestem and other bunch grasses in pastures, neglected fields, roadsides, etc., in November and December; by spraying in wheat fields and trapping by means of barriers in May and June, followed by spraying in marginal rows of maize if necessary; and by ploughing maize stubble deeply in September before the bugs have gone into winter cover. It is pointed out that an outbreak is most likely where there are suitable hibernating places, and when warm, dry weather occurs during the two critical hatching periods, namely May to June and August to September. The most suitable implements and materials for use in control work are described, and the necessity is urged for co-operation in all remedial campaigns.

RIXFORD (G. P.). **Smyrna Fig Culture.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 732, 14th November 1918, 43 pp., 12 figs. [Received 15th June 1922.]

The method of pollination of Smyrna and other figs by *Blastophaga psenes*, introduced on to the trees in caprifigs, is described and an account is given of the life-history of the insect. Most of this information has previously been noticed [*R.A.E.*, A, ix, 115].

GAHAN (A. B.). U.S. Bur. Ent. **Descriptions of miscellaneous new reared Parasitic Hymenoptera.**—*Proc. U.S. Nat. Mus., Washington*, lxi, art. 24, no. 2445, 1922, pp. 1–24, 1 plate. [Received 19th June 1922.]

The new species dealt with include the Braconid, *Microbracon caulicola*, reared from *Pyrausta ainsliei*, Heinr., from Illinois; the Ichneumonid, *Gelis microplitidis*, reared from cocoons of *Microplitis gortynae*, Riley, parasitising *Papaipema nitela*, Guen. (*nebris*, Guen.), and also a secondary parasite of *P. marginidens*, Guen., from New York; the Eurytomid, *Harmolita lolii*, occurring on *Lolium temulentum* and *L. multiflorum* in California, of which but one generation a year is indicated, the adults emerging from the previous year's growth early in the spring and ovipositing in the young grass of the current season, the larvae maturing in early summer and remaining in the stems either as larvae or pupae until the following spring; the Pteromalid, *Polyscelis modestus*, bred from *Mayetiola destructor*, Say, from Pennsylvania; the Eupelmid, *Calosoter metallicus*, reared from wheat stems containing *Harmolita* sp., and from *Mayetiola* (*Phytophaga*) *destructor*, Say, from California; the Eulophid, *Coccophagus saissetiae*, reared from *Saissetia nigra*, Nietn., from Panama Canal Zone; and the Scelionid, *Telenomus* (*Prophanurus*) *busseolae* reared from eggs of *Busseola fusca*, Hmps., from Natal.

The Eupelmid, *Eupelmus popa*, Gir., is recorded from the Cecidomyiids, *Contarinia sorghicola*, Coq., from Curacao, Dutch Antilles, and Texas, and *C. caudata*, Felt, from India.

A key is given for the differentiation of the two American species of *Polyscelis*, *P. modestus* and *P. websteri*, Ashm.

CUSHMAN (R. A.). **On the Ashmead Manuscript Species of Ichneumonidae of Mrs. Slosson's Mount Washington Lists.**—*Proc. U.S. Nat. Mus., Washington*, lxi, art. 8, no. 2429, 1922, pp. 1-30. [Received 19th June 1922.]

Of the 58 Ichneumonids recorded in these lists, 54 have been identified; these are discussed and described where new.

HORNE (W. T.) & ESSIG (E. O.). **Plant Disease and Pest Control.**—*Univ. California Agric. Expt. Sta.* [*Berkeley*], Circ. 227, June 1921, 69 pp. [Received 15th June 1922.]

This is a revised and enlarged edition of an earlier circular, which has been previously noticed [*R.A.E.*, A, viii, 85], the information on pests and diseases being given under the crops attacked.

HILL (C. C.). U.S. Bur. Ent. **A Preliminary Account of Two Serphoid (Proctotrypoid) Parasites of the Hessian Fly.**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 5, May 1922, pp. 109–117.

The Proctotrupids, *Platygaster vernalis*, Myers, and *P. hiemalis*, Forbes, which are both important parasites of the Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, have frequently been confused owing to the similarity in appearance of their adult stages and the lack of information concerning their life-histories. The present preliminary notes are therefore published, pending the completion of more exhaustive investigations. *P. vernalis* emerges in early spring when the Hessian flies are beginning to oviposit, and deposits eggs singly in the eggs of its host, or in the newly-hatched larvae before they have left the exposed surface of the leaf. The egg of the parasite develops in the mid-intestine of the host, and the primary larvae begin to imbibe the chyle from the host stomach and ingest particles of the stomach wall. When almost the entire contents of the host are consumed, each larva forms a separate cocoon, in which it pupates. The parasitised host larva very seldom succeeds in pupating. Pupation of the parasite usually occurs about the end of July, and by the end of the first week in August the adult stage is probably reached, the autumn and winter being passed in this stage in the cocoons. Occasionally adults emerge in autumn and oviposit in the autumn generation of the host, but field observations indicate that these ovipositions fail to mature.

P. hiemalis, Forbes, has but one generation in a year, the adults emerging in autumn when the Hessian flies are laying their eggs for the over-wintering generation. The parasite deposits an average of 4·22 eggs at each oviposition in the host egg or young larva. Cold weather greatly retards the development of the growing embryos, and frequently the early summer is passed in the embryonic stage in the body cavity of the host. The larvae soon devour almost the whole body-content. Pupation occurs during July, from 1 to 23 cocoons being found in one puparium, and by the end of August the majority have developed into adults. Weather conditions have a great effect on the seasonal history, and adults occasionally emerge throughout the summer months.

The characters differentiating the two species in their immature and adult stages are enumerated.

WICKHAM (H. F.). **Weevils of the Genus *Apion* injurious to Beans in Mexico.**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 5, May 1922, pp. 118–122.

During observations on the Mexican bean beetle [*Epilachna corrupta*, Muls.] many bean plants were found infested by species of *Apion*, which ate small holes in the leaves. These weevils occurred on bean plants all round Mexico City, one species being identified as *A. griseum*, Smith, and three other species being apparently unknown in Mexico. Infested pods showed yellow or brownish discolorations along the sides, rot frequently setting in from these blotches and breaking down the tissues. The grubs were found to burrow well within the seed while the latter was still soft, but sometimes fed largely from the surface. The larva constructs a pupal case within the bean pod, and the adult emerges by making an irregular opening in the cell. Adults and feeding and other larvae can frequently be found in one pod. The damage in the most carefully examined plot was estimated at about

80 per cent. Badly attacked seed did not mature in the pod but shrivelled and became distorted. The adults seem to depend upon the pod splitting to effect their escape. The danger of introduction of the pest into the United States would therefore seem to lie in permitting shipment of green beans from Mexico. The author considers that in the Mexico City district this is a worse pest than *E. corrupta*.

CUSHMAN (R. A.). U.S. Bur. Ent. **The Identity of *Habrobracon brevicornis* (Wesmael) (Hym., Braconidae).**—*Proc. Ent. Soc. Washington, D.C.*, xxiv, no. 5, May 1922, pp. 122-123.

Basing the determination of the species on the number of joints of the antennae, the author, following Marshall's determination, formerly treated *Bracon juglandis*, Ashm., *Habrobracon hebetor*, Johns (nec Say), and *B.* (*H.*) *honestor*, Riley & How. (misprint for *hebetor*) as synonyms of *H. brevicornis*, Wesm. The species for which this name has been used is apparently invariably parasitic on Lepidopterous larvae, such as *Ephestia*, *Plodia* and *Galleria*, infesting stored products.

In connection, however, with the importation into the United States from Europe of parasites of *Pyrausta nubilalis*, Hb. (European cornborer), a species of *Habrobracon* has been reared that is very closely allied to the one previously determined as *brevicornis*, and there seems no doubt but that this European insect is the true *H. brevicornis*, Wesm. It will therefore be necessary to call the parasite of storage insects by the oldest name, which is *juglandis*, Ashm. The records of *H. brevicornis* as a parasite of *Dioryctria abietella* and of *Myelois ceratoniae* probably do refer to the true *brevicornis*. The characters separating *H. brevicornis*, Wesm., and *H. juglandis*, Ashm., are given.

KNIGHT (H. H.). **Monograph of the North American Species of *Deraeocoris*—Heteroptera, Miridae.**—*Univ. Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul*, Tech. Bull. 1, June 1921, pp. 76–210, 3 plates, 44 figs. [Received 20th June 1922.]

This monograph has previously been noticed from another source [*R.A.E.*, A, ix, 438].

MOORE (W.). **Spreading and Adherence of Arsenical Sprays.**—*Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul*, Tech. Bull. 2, June 1921, 50 pp., 1 fig.

The following is the author's summary of this paper:—

The addition of material similar in chemical constitution to the leaf surface causes the spray mixture to form a film of liquid over the leaf. The positive absorption of the added material at the leaf-spray interface, resulting in a lowering of the interfacial tension, appears to offer the best explanation of the results. Different types of leaves naturally require different materials. Thus organic compounds such as beechwood creosote, carvacrol, or amyl alcohol, soluble in fats and waxes and but slightly soluble in water, produce good spreading over waxy leaves, such as cabbage. Various proteins and plant infusions give good spreading on leaves with surface of cellulose, even when they are strongly cutinised, as in the case of plum and citrus leaves. Suspensions containing small-sized particles adhere better than those with larger particles. An even distribution of the spray over the leaf tends to increase the adherence. The leaf surface, when wet, exhibits a negative electric charge. The common compounds

of arsenic, such as lead arsenate, Paris green, calcium arsenate, and others, have particles carrying negative electric charges. Arsenic compounds of aluminium, chromium, and iron may be prepared so that the particles carry a positive charge. Ferric arsenate appears the most promising and is more toxic than lead arsenate. Field tests show that electrically positive arsenical preparations adhere more strongly to the leaf surface than do those that are negatively charged. Ferric oxide or hydroxide, by adsorbing compounds of arsenate, lower their toxicity to insects. The ratio of the amount of the arsenic compound in the body to that in the excreta is a better basis of comparing the toxicity of different arsenical preparations than tests based on the food consumed or the time required to produce death.

O'Kane (W. C.) & Osgood (W. A.). **Studies in Termite Control.**—*New Hampshire Agric. Expt. Sta., Durham,* Bull. 204, April 1922, 20 pp., 1 plate, 5 figs.

The following is a portion of the authors' summary :—

The infestation here described took place in a modern hospital in a New Hampshire city and involved extensive damage to partitions, floors, beams and other woodwork. A large amount of infested material was removed and destroyed. Tiles and cement were substituted. Preliminary experiments were arranged to determine the time and temperature factors necessary to kill termites in wooden beams by heat. Supplementary steam piping was installed in the basement, and the temperature was raised to 135° F. for 24 hours. No living termites have since been discovered within the building. The structure remained in undisturbed use for hospital purposes while the heat treatment was going on. Extensive infestation was found through much of the hospital grounds. Board traps were utilised to discover the extent of this infestation. Timbers, board walks, apple trees, etc., were removed. A mixture of Phinotas oil and water at a dilution of ½ per cent. was used to kill termites in the ground and to render the ground unacceptable to them.

Bodkin (G. E.). **The Scale Insects of British Guiana.**—*Jl. Bd. Agric. Brit. Guiana, Georgetown,* xv, no. 2, April 1922, pp. 56–63.

Ninety-four species of scale-insects are recorded from British Guiana, and notes on those collected in 1914 are given [*cf. R.A.E.*, A, ii, 416, etc.].

Hegh (E.). **Les Termites.**—*Bull. Agric. Congo Belge, Brussels,* xiii, no. 1, March 1922, pp. 91–204, 70 figs. [Received 22nd June 1922.]

In this instalment of his monograph on African termites [*R.A.E.*, A, x, 284] the author deals particularly with the construction of the nests.

The distribution of termites in Australasia is discussed in an appendix, and a list is given of 80 species known to occur there up to 1919.

Miège (E.). **Sur deux Insectes parasites au Maroc :** *Tephroclystia pumilata* et *Plusia chalcytes.*—*Bull. Soc. Path. Vég. France, Paris,* ix, no. 1, January–March 1922, pp. 52–54.

The Geometrid, *Tephroclystia pumilata*, is recorded as a pest of maize in Morocco. The eggs are laid on the stigmata of the female

inflorescence, and the larvae feed on the styles, biting them through as they make their way to the tip of the ear, and then attacking and destroying the grain. When mature they shelter in the spathes, where they pupate, the adults emerging about 20 days later. The damage done is not very serious.

Another pest of moderate importance is *Phytometra* (*Plusia*) *chalcytês*, which was observed damaging tomatos in July, and has been recorded as injuring various vegetable crops. The larvae live for preference on the young fruit, eating the fleshy part, and are also found on the leaves. Pupation takes place in a silken cocoon spun by the larva, and lasts 15–20 days.

GIRAUD (E.). **Maladie de l'Ile de Wight.**—*L'Apiculteur, Paris*, lxvi, no. 6, June 1922, pp. 185–191.

Isle of Wight disease among bees has made its appearance in France. An account is given of the discoveries of Rennie and other workers [*R.A.E.*, A, ix, 275, 338, etc.] in connection with this disease. An article written by M. Emile Duchemin in 1866 is quoted, in which he described heavy losses among bees due to the presence of an Acarid discovered on bees and also on the plant, *Helianthus annuus*. Apparently reproduction occurred on the plant, from which the bees became infected. In a note commenting upon this paper, M. E. Sevalle asks whether this Acarid is likely to be the same as *Acarapis* (*Tarsonemus*) *woodi*, and points out that it seems to have been an external parasite.

MANON (—). **Les Insectes Rongeurs de Plomb.** [Lead-boring Insects.] —*Rev. Zool. Agric. & Appl., Bordeaux*, xxi, no. 4, April 1922, pp. 53–61, 4 figs.

In May 1921, recently constructed sulphuric acid lead tanks in an ironworks near Bordeaux were found to have holes made in them by the larvae of the wood wasp, *Sirex gigas*, L. [*cf. R.A.E.*, A, x, 60]. Impregnation of the timber used for casing lead tanks will prevent this injury, but it is very difficult to ascertain if the wood is infested unless the mines are revealed by sawing. *Sirex* infestation can be avoided by not using coniferous timber, but in this case there is a danger from other borers.

The Cynipid, *Ibalia cultellator*, F., and the Ichneumonids, *Coleocentrus excitator*, Poda, and *Rhyssa persuasoria*, L., are parasites of *S. gigas*.

GATTEFOSSÉ (R.-M.). **L'Oléorésine de Pyrèthre.**—*Jl. Soc. Nat. Hortic. France, Paris*, xxiii, May 1922, pp. 190–192.

The information given in this paper is substantially the same as in one already noticed [*R.A.E.*, A, x, 346].

LHOSTE (L.). **La Bruche des Haricots.**—*Jl. Soc. Nat. Hortic. France, Paris*, xxiii, May 1922, pp. 199–200.

In this note on *Bruchus obtectus*, Say, it is pointed out that as the generations (usually four a year) follow without interruption, it is important not to introduce this pest into stores because not only beans but other leguminous seeds will become infested. Cereals seem to escape, though the beetle can be fed on maize. Reference is made to Razzauti's work on the biology of this Bruchid [*R.A.E.*, A, vi, 468].

GÉROME (J.). **Au Sujet de la Bruche des Haricots provenant du Pérou.**—*Jl. Soc. Nat. Hortic. France, Paris*, xxiii, May 1922, pp. 200–201.

Referring to two samples of beans (*Phaseolus vulgaris*) gathered from plants obtained from seed from Peru, it is pointed out that while in one all the beans were infested by *Bruchus obtectus*, Say, the beans of the other were intact, the unopened pods having been placed in a sample bag at the time of gathering. Later varieties, also from Peru and grown at the same time, remained unattacked.

SUPINO (F.). **Notizie sopra due Insetti dannosi all'Agricoltura.** [Notes on two Insects injurious to Agriculture.]—*Natura, Milan*, xii, January–March 1921, pp. 31–33.

During recent years the beetles, *Epicometis* (*Tropinota*) *hirta*, Poda, and *Oxythyrea funesta*, Poda, have done some damage to rye near Milan, about 20 per cent. of the crop being lost. They are known pests of the grape-vine, wheat, etc., but the damage done is very intermittent, and for a long period they have not attracted any notice. Early in April they appear on the flowers of colza, then on *Ranunculus*, and later on dandelion. About mid-April they migrate to rye, which they leave a month later. At the end of May or early in June the larvae can be found in the ground. It is remarkable that wheat adjoining rye was not infested. The collection of the adults is advised.

LEEFMANS (S.). **De Klappertor en de Palmsnuitkever.** [The Coconut Beetle.]—*Teysmannia, Batavia*, xxxii, no. 11–12, 1921, pp. 477–494, 4 plates. [Received 20th June 1922.]

This information on *Oryctes rhinoceros*, L., and *Rhynchophorus ferrugineus*, Oliv., is taken from two recent publications already noticed [*R.A.E.*, A, ix, 45, 297].

VAN HALL (C. J. J.). **De Gezondheidstoestand van onze Cultuurgewassen in de Jaren 1920 en 1921.** [The Health of our Cultivated Plants in 1920 and 1921.]—*Teysmannia, Batavia*, xxxiii, no. 1–2, 1922, pp. 15–23.

Mites did little injury to cassava, and kedelé [*Glycine soja*] suffered little from the pod-borer, *Etiella* [*zinckenella*], and the stem-borer, *Agromyza sojae*. Potatoes suffered much in 1920 from infestation by *Epilachna*, but this Coccinellid was unimportant in 1921. Coconuts were injured by *Brachartona* [*catoxantha*]. The coffee-berry borer, *Stephanoderes hampei*, increased to such an extent as to become one of the most dangerous coffee pests. Tea would probably have been almost uninjured had not the crisis in tea prices compelled a reduction in remedial measures against *Helopeltis* and other pests.

Other reviews of the insect pests in 1920 and 1921 have been noticed elsewhere [*R.A.E.*, A, ix, 507; x, 375].

VAN STETTEN (D. J. G.). **De *Podops*-Plaag in de Rijst.** [The Infestation of Rice by *Podops*.]—*Teysmannia, Batavia*, xxxiii, no. 1–2, 1922, pp. 47–50.

A bug, *Podops* [*vermiculata*], which is of no importance as a pest of rice in Java, where it occurs only sporadically, causes severe injury

to this crop in Sumatra, being its chief pest in the south of the island. Its attack is especially severe on rice growing in marshy localities. The wild rice found in such places is probably a food-plant. Though *Podops* is found in hilly areas, it does little harm there. The younger plants are retarded in growth and their leaves turn yellow, owing to the sucking of the stems. As a rule, measures are useless unless it has been possible to apply them early. The most practical method consists in flooding the rice-field and in sending a number of men through it, disturbing each plant so as to drive the bugs on to the water and into a corner of the field, where they may be collected. The water must be let out immediately afterwards. This procedure may be repeated a few days later. The critical period is when the rice is less than three months old. The above method is impracticable in many cases either from lack of water or from its being impossible to flood the field. In such cases there is no remedy unless natural causes check the infestation. If early attack is followed by a very marked drought of short duration, the bug will disappear, and the plants will not suffer if normal rains then occur. As the bug avoids light, an indirect means of combating it would be to adopt more sparse planting allowing of free access to sunshine. The selection of strong varieties of rice with stout stalks is a further protection against this pest.

POLAK (I. M. W.). **Het Greppelwiel (Een vermoedelijke Oplossing van het Emeltenvraagstuk).** [The Furrowing Wheel. A Possible Solution of the Problem of destroying Leather-jackets.]—*Meded. Landbouwhoogeschool, Wageningen,* xxiv, no. 2, 1922, 8 pp., 4 plates. (With a Summary in English.)

The implement described here will, it is hoped, provide a better method for capturing leather-jackets [*Tipula*] than that of digging trap trenches, as at present practised. It cuts narrow, deep ruts with vertical sides, and by making such ruts about 5–7 ft. apart it is believed to be possible to "drain" a field of the Tipulids infesting it. An actual test in this respect could not be made owing to a lack of infestation at the time. The apparatus consists of a solid cast metal wheel about 22 in. in diameter and about 1¼ in. thick. This is fixed underneath a farm cart weighted so as to press the rim of the wheel into the ground to a depth of about 2¾ in. The wheel can be raised off the ground by means of a lever.

JONES (C. R.), HOERNER (J.) & CORKINS (C. L.). **Methods of combating four Field Crop Pests in Colorado.**—*Colorado Agric. Coll. Extens. Service, Fort Collins,* Series 1, no. 179-A, June 1921, 28 pp., 1 plate, 4 figs. [Received 29th June 1922.]

Loxostege sticticalis, L. (beet webworm) is one of the most destructive pests of sugar-beet, and causes greater loss to the sugar industry in Colorado than any other pest. Its natural enemies include birds and the Hymenopterous parasites, *Cremnops vulgaris,* Cress., and *Mesochorus agilis,* Cress. [but *cf. R.A.E.*, A, vii, 10]. Clean cultivation is an important factor in control; arsenicals are also effective, but depend largely on the time of application, which should be when the larvae are only a few days old.

L. commixtalis, Wlk. (alfalfa webworm) causes serious injury to lucerne and also attacks sugar-beet. A list is given of nine cultivated

and nineteen uncultivated food-plants. Very little is known about the natural enemies of this moth. The ground beetle, *Pterostichus scitulus*, Lec., and poultry and other birds feed on the larvae. Remedial measures should aim at forcing the development of the plants so that they may outgrow the injury, and at an early harvest, after which the stubble should be sprayed with lead arsenate.

Chorizagrotis auxiliaris, Grote (army cutworm) feeds on lucerne, sugar-beet, barley and wheat, and is often troublesome on early vegetables. Remedial measures include poison baits, trap furrows, and spraying with arsenicals. Birds and ground squirrels destroy large numbers. Its insect enemies are numerous, the more important being a Chalcid, *Copidosoma* sp., an Ichneumonid, *Amblyteles longula*, Cress., a Braconid, *Microgaster* sp., and a Chalcid, *Berecyntus bakeri*, How.

Porosagrotis orthogonia, Morr. (pale western cutworm) has caused considerable injury to winter wheat. There are at present no satisfactory remedial measures either natural or artificial, and it is uncertain whether the moth will become a serious pest or whether the present abundance will diminish without apparent cause. Irrigation in the autumn may possibly prove of use in combating it.

UVAROV (B. P.). **Новейшие Данные Иностранной Литературы по Технике Борьбы с Саранчевыми.** [The latest Information in Foreign Literature on the Control of Locusts.]—**С. Х. Ученый Комитет, Отдел Прикладной Энтомологии** [*Agric. Sci. Committee, Dept. App. Ent.*], *Petrograd*, 1922, 14 pp., 4 figs.

This information on the appliances and methods adopted for the destruction of locusts is taken from foreign literature published in 1915–21.

PUKHOV (B. A.). **Организация защиты Урожая 1921 года в западной Сибири от Вредителей.** [Organisation of Protection of the 1921 Crop in Western Siberia from Pests.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October, 1920*], *Petersburg*, 1921, pp. 28–37. [Received 21st June 1922.]

In view of the position of Siberia as the source of the grain supply for European Russia and the great losses there due to pests, particularly locusts, a central entomological bureau has been founded, the status of which has been acknowledged by the Siberian Revolutionary Committee. Work was begun on 15th May 1920, and included mainly observations on the occurrence of locusts. From the oviposition areas located in the various districts it is evident that an even greater invasion might be expected in 1921 than in previous years.

A detailed plan of campaign is to be worked out, taking into consideration the local conditions. During the past three years the best results were obtained with poisoned baits. During 1919 this method was further developed by the West-Siberian Expedition in the Tomsk district by substituting sawdust and manure for other

materials. There is urgent need of co-operation in the various districts, and unless very drastic measures are undertaken, the destruction of the whole of the 1921 crop is to be expected.

BEREJKOV (R. P.). **Два года противосаранчевых работ в Томской Губернии.** [Two Years of Anti-locust Work in the Government of Tomsk.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 38–42. [Received 21st June 1922].

Locusts are the most important agricultural pests in the Tomsk district, the species chiefly concerned being *Gomphocerus sibiricus*, L., and *Stauroderus scalaris*, Fisch. (*Stenobothrus morio*, L.). The damage caused reached its maximum in 1918, when over 351,000 acres of grain crops were destroyed; in 1919 and 1920 the injury reached 162,000 and 243,000 acres respectively. Extensive remedial measures were planned, but had to be greatly reduced owing to the delay in obtaining materials, etc. Although carried out on a smaller scale than first intended, the results were very promising, and the consequent co-operation of the population was secured for 1920. The work in this year had, however, again to be curtailed. Owing to the success obtained with poisoned baits, the remedial measures have been entirely restricted to this method, the low cost (especially when sawdust and manure are used), easy application and the general independence of weather conditions being some of the main points in its favour. For the operations in 1921 it was estimated that over 32 tons of sodium arsenite would be required.

MEGALOV (A. A.). **Краткий Отчет о Деятельности Станции Зашиты Растений от Вредителей Саратовского Губземотдела.** [Brief Report on the Activities of the Station for the Protection of Plants from Pests in the Saratov District.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 43–47. [Received 21st June 1922.]

A brief outline is given of the work carried out by the Saratov Station for the protection of plants from pests, chiefly during 1919. Owing to the political conditions and the consequent difficulty in obtaining supplies of poison materials, appliances, etc., the work done was very limited. For the same reasons, as well as for the lack of instructors, the large scale demonstrations that had been planned had to be abandoned.

A list is given of the commoner and more important insect pests causing serious injury in various localities. These include *Calopternus italicus*, L., occurring in the southern districts, where, owing to the favourable conditions, a large infestation of this locust was to be expected in 1921; *Aporia crataegi*, L., particularly abundant in certain districts, but less noticeable than in previous years owing to the activities of parasites; and *Agrotis segetum*, Schiff., occurring in the northern parts of the district, but causing less damage than in previous years, the last great infestation having occurred in 1918, when 11,610 acres of the winter-sown crops were destroyed.

CHIMIKUS (G. N.). **Отчет о Деятельности энтомологического Персонала Сельско - Хозяйственного Подотдела Тамбовского Губземотсовхоза в 1920 г.** [Report on the Activities of the Entomological Staff of the Agricultural Sub-department of Tambov in 1920.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 48–52. [Received 21st June 1922.]

The work of the entomological staff in the Tambov district has been carried on under great difficulties, chiefly owing to the insufficient number of workers and the lack of materials; for this reason the actual application of remedial measures was also very limited, and demonstrations were restricted to the immediate environment of the town. Brief notes are given on some of the common insect pests occurring in 1919 and 1920, with an outline of the work as planned for 1921.

LEBEDEV (F. N.). **Доклад Начальника Газовой Экспедиции Народного Комисариата Земледелия о применении удушливых средств в деле с Вредителями сельского хозяйства.** [Report of the Director of the Gas Expedition of the National Commissariat of Agriculture on the Application of Asphyxiating Substances in connection with the Control of Agricultural Pests.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 70–73. [Received 21st June 1922.]

As a result of experiments carried out in 1917 the author considered asphyxiating gases to be superior to the substances generally used for the destruction of agricultural pests such as locusts. Subsequent observations, although carried out under very trying circumstances, have confirmed this opinion. A brief account of this work carried out in 1918, 1919 and 1920 is given. The lethal dose of chlorine for locusts was found to be not less than 0·1 volume per cent. Even a dose of 1·55 per cent. does not affect the germination of grain, though it slightly retards growth.

SOLDAU (P. Ia.). **Применение удушливых газов для уничтожение вредителей сельского хозяйства (сусликов и саранчи).** [The Application of Asphyxiating Gases for the Destruction of Agricultural Pests (Ground Squirrels and Locusts).]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 74–87. [Received 21st June 1922.]

Details are given of the technique employed and the prevailing weather conditions in the experiments dealt with in the preceding paper. These experiments could not be carried out under natural conditions and were limited to the liberation of chlorine gas over masses of locusts placed at varying distances away.

Although these experiments cannot be considered conclusive, they undoubtedly show that locusts only succumb to concentrations above 0·1 volume per cent. The liberation of gas must be continued for at least 15 minutes.

Kulagin (N. M.). **О Появлении Саранчевых в XVIII и XIX Столетиях в Европе.** [The Occurrence of Locusts in the Eighteenth and Nineteenth Centuries in Europe.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 109–122. [Received 21st June 1922.]

The object of this paper is to amplify previous records [*R.A.E.*, A, v, 100] by the addition of Russian ones, as well as those of the neighbouring countries.

From the available material it is evident that a periodicity of appearance cannot be established either for Europe in general or for any particular country in Europe. The absence of such periodicity is due to the complexity of the factors influencing the maximum reproduction of these insects. Locusts, having once appeared *en masse*, generally remain in large numbers for two or three years at least. Maximum reproduction is usually observed in warmer years, although some species may appear *en masse* at comparatively low temperatures. Humidity is one of the essential factors in their development.

Dobrodeev (A. I.). **Просяной или Кукурузный Мотылек** (*Pyrausta nubilalis*, Hüb.).—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 123–128. [Received 21st June 1922.]

An account is given of the life-history of *Pyrausta nubilalis*, Hb., the damage caused by this moth and the general remedial measures for it. In the Don district two generations a year generally occur, but in Voronezh only one has been observed.

The collection of eggs is advocated in infested kitchen gardens, and wherever the more intensive cultivation of valuable plants is practised.

Of the natural enemies a Tachinid has been found in the Don district and a Chalcid near Voronezh, but they have not yet been identified.

Velitchkevitch (A. I.). **К Биологии Мух, минурующих листья Злаков в Новгородской губернии.** [On the Biology of Flies Mining the Leaves of Graminaceae in the Novgorod District.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 129–135. [Received 21st June 1922.]

This paper endeavours to rouse greater interest in the study of insects mining in the leaves of various Graminaceous plants. *Agromyza scutellata*, Fall., and *A. pusilla*, Meig., which is considered by some authorities to be only a variety of the former, are dealt with in detail.

A. pusilla is recorded from potatoes, *Spiraea ulmaria, Hyoscyamus niger, Galeopsis versicolor, Stachys silvatica* and *Euphorbia*; *A. scutellata* from *Vicia cracca* and *V. faba*. They had not been recorded hitherto from Graminaceous plants, but the author found the larvae exclusively on oats, except that the third generation was induced to lay its eggs on winter rye and wheat owing to the scarcity of the usual food-plant. The larvae eat out the parenchyma of the leaves along the veins. The eggs are laid singly under the epidermis; the beginning of the larval mines was noticed 3–5 days after oviposition. The larval stage lasts from 5–7 days; when fully grown the larvae emerge from the mine and pupate in the ground at a depth of one centimetre. Pupation takes three weeks or longer. In captivity the adults live from 5–7 days, seldom longer. During 1920 three generations occurred, the first adults appearing at the end of May and beginning of June, the next from 23rd July, and the third about 25th August, the numbers decreasing suddenly after 7th September. About 20 per cent. of the leaves were attacked by the first generation, the infestation falling later to about 8-9 per cent. Some of the pupae of the first and second and all of those of the third generation overwintered. The larvae are heavily infested by Chalcids and Braconids, about 45 per cent. of the first generation and about 90 of the second being parasitised.

A. lateralis is recorded from rye and timothy. On the latter another species of *Agromyza* was also found. Larvae belonging to the genus *Anthomyia* were found mining in the leaves of *Datura stramonium* and *Polygonum* sp.

TROITZKY (N. N.). **О Капусте, капустной мухе и киле.** [About Cabbage, *Chortophila brassicae* and *Plasmodiophora brassicae*.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 20–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 165–177, 6 figs. [Received 21st June 1922.]

Cabbages are a very important crop in the north of Russia, and are also extensively used in crop rotation. Great damage is caused by *Phorbia (Chortophila) brassicae*, Bch., especially at the time of transplanting. As it is almost impossible to free the roots of the seedlings entirely from the larvae and eggs, disinfection with the following substances has been tried:—Quassia, quassia and green soap, green soap alone, tobacco extract, and kerosene emulsion. The plants were dipped with the surrounding earth into the insecticide until the earth was saturated, after which they were transferred to the field. The harvest from the disinfected plants, particularly those treated with quassia, was greatly increased in comparison with untreated plants. Kerosene and tobacco apparently retard the growth of the plant. The treated plants also suffered less from the fungus, *Plasmodiophora brassicae*.

MODESTOV (V. V.). **К Вопросу об организации Фенологических наблюдении.** [On the Question of the Organisation of Phenological Observations.]—**Труды 2го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 25–30 Октября 1920 года** [*Proc. 2nd All-Russian Entomo-Phytopath. Meeting in Petrograd, 25th–30th October 1920*], *Petersburg*, 1921, pp. 178–180. [Received 21st June 1922.]

Attention is called to the importance in entomology of a systematic study of the effect of climatic conditions.

Pospielov (V. P.). **Задачи и организация отдела прикладной Энтомологии Сельско-Хозяйственного Ученого Комитета.** [Problems and Organisation of the Division of Applied Entomology of the Agricultural Scientific Committee.]—**Известия Отдела Прикладной Энтомологии, С. Х. ученый Комитет** [*Repts. Bur. App. Ent., Agric. Sci. Comm.*] [*Petersburg*], i, 1921, pp. 5-13. [Received 21st June 1922.]

The scope of applied entomology in general and the programme of work of the above institution are outlined.

Pospielov (V. P.). **Хлебный Клещик** (*Pediculopsis graminum*, Reut.), **как причина белоколосости ржи.** [*Pediculopsis graminum* as the Cause of White-ear of Rye.]—**Известия Отдела Прикладной Энтомологии, С. Х. ученый Комитет** [*Repts. Bur. App. Ent., Agric. Sci. Comm.*] [*Petersburg*], i, 1921, pp. 62–79, 2 plates. [Received 21st June 1922.]

The condition of rye known as white-ear is due to various pests, including *Pediculopsis graminum*, Reut. During 1920 about 50 per cent. of the rye in the Voronezh district was attacked The biology of this mite is quoted, chiefly from the observations of E. Reuter. As it is an important pest in Russia, it is hoped that it will be given further consideration by local entomologists.

Meier (N. F.). **К Фауне Наездников (Ichneumonidae) Тамбовской губернии.** [The Ichneumonid Fauna of the Tambov District.]—**Известия Отдела Прикладной Энтомологии, С. Х. ученый Комитет** [*Repts. Bur. App. Ent., Agric. Sci. Comm.*] [*Petersburg*], i, 1921, pp. 80–90. [Received 21st June 1922.]

This list of the Ichneumonids collected in the Tambov district comprises 145 species, including *Exetastes albomaculatus*, sp. n., and *Pimpla holmgreni* var. *rubrofascialis*, n., descriptions of which are given in German.

Dobrodeev (A. I.). **Большой лиственничный пилильщик.** [*Lygaeonematus erichsoni*, Hart.]—**Известия Отдела Прикладной Энтомологии, С. Х. ученый Комитет** [*Repts. Bur. App. Ent., Agric. Sci. Comm.*] [*Petersburg*], i, 1921, pp. 100–128, 1 plate. [Received 21st June 1922.]

During 1914 *Lygaeonematus* (*Nematus*) *erichsoni*, Hart., was very abundant in the Penza district. The various stages of this sawfly are described, as well as its life-history and the remedial measures for it [*R.A.E.*, A, ii, 372; iv, 243]. The author found the first adult on 9th May and the first eggs and larvae on 1st June. These eggs hatched in seven days. There is one generation a year. The only parasites found were a Tachinid, *Argyrophylax bimaculata*, Hart., a Chalcid, *Trichomalus* sp., and the fungus, *Isaria farinosa*.

TROITZKY (N. N.). **К анатомии женского полового аппарата вишневого слоника** *Rhynchites auratus*, **Scop.** [On the Anatomy of the Female Genitalia of *Rhynchites auratus*, Scop.]—**Известия Отдела Прикладной Энтомологии, С. Х. ученый Комитет** [*Repts. Bur. App. Ent., Agric. Sci. Comm.*] [*Petersburg*], i, 1921, pp. 129–152, 7 figs. [Received 21st June 1922.]

This paper, the contents of which are indicated by its title, has a summary in German.

FROGGATT (W. W.). **Parasites of Olive Scale.**—*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 5, 1st May 1922, p. 322.

During investigations on the life-history of the Chalcid parasites of the olive scale, *Saissetia* (*Lecanium*) *oleae*, two generations of the scale and two of its parasites were bred during the year. From these observations it is suggested that the best times for spraying for *S. oleae* would be the middle of September and the middle of February, when the young parasites are emerging from the adult female scales.

FROGGATT (W. W.). **Leaf Galls of Phylloxera at Howlong.**—*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 5, 1st May 1922, p. 360, 5 figs.

Leaf-galls of *Phylloxera vastatrix* are recorded from New South Wales for the first time. These are produced by the gallicole forms hatched from the winter eggs, which puncture the lower surface of the leaves and produce the galls. This form is peculiar to different species of American vines and has very rarely been found on the foliage of *Vitis vinifera*. Each of the blister galls contains a gallicole aphis surrounded by eggs or larvae; later on the active larvae make their way down to the roots.

JEPSON (F. P.). **The present Prevalence of Shot-hole Borer of Tea.**—*Trop. Agric., Peradeniya*, lviii, no. 2, February 1922, pp. 118–125.

Statistics have been obtained with regard to the prevalence of shot-hole borer of tea [*Xyleborus fornicatus*] by sending circulars to all borer-infested estates with requests for information on this point. The answers indicate that the borer is either more prevalent or is extending its activities in seven districts and possibly in a further five, while 29 districts are declared to be freer than before. Seventy-four opinions were voluntarily expressed regarding the connection between improved cultivation and reduced borer attack.

Destructive Insect and Pest Act Advisory Board. P.C. 840.—*Canada Dept. Agric., Ottawa*, 5th May 1922. [1 p. MS.]

Acting under the authority of the Destructive Insect and Pest Act, a Destructive Insect and Pest Act Advisory Board has been appointed, the organisation of which is described.

Amendment to the Apple Sucker Quarantine in Nova Scotia. Amendment no. 2 to Quarantine no. 1 (Domestic).—*Agric. Gaz. Canada, Ottawa*, ix, no. 3, May–June 1922, p. 243.

Since the order quarantining the vicinity of Wolfville on account of the discovery there of *Psylla mali*, Schmidb. (apple-sucker) [*R.A.E.*, A, viii, 168] the insect has been found in the county of Halifax, Nova Scotia. A ministerial order was therefore passed, on 15th November 1921, prohibiting the removal of nursery stock from that county unless accompanied by a certificate of inspection or a permit.

Phillips (W. J.), Underhill (G. W.) & Poos (F. W.). **The larger Corn Stalk-borer in Virginia.**—*Virginia Agric. Expt. Sta., Blacksburg*, Tech. Bull. 22, June 1921, 30 pp., 3 figs., 7 tables, 4 plates. [Received 23rd June 1922.]

The history, distribution, food-plants, and natural enemies of *Diatraea zeacolella*, Dyar (larger corn stalk-borer) in Virginia are recorded, and a brief description of all stages of this insect with its life-history and the character and extent of the injury it causes are also given. There are two generations a year, hibernation being passed in the larval stage. Eggs are laid in clusters of from 3–15 and hatch in 10–15 days. The larvae first feed on the unfolded leaves of the heart of the plant and then work down into the stalk. The larvae of the second generation feed in the heart of late maize and also tunnel the stalks severely.

Late maize suffers less than early as it is not so severely attacked by the first generation, but for conditions in Virginia late planting is not recommended, as equal loss is caused to this crop by other insects.

An economical and simple remedial measure is ploughing the stubble out with a turning plough, then harrowing the land not later than 10th December and allowing it to remain exposed till the first week in March. Data from the experiments undertaken in 1920–21 in an average winter showed almost 100 per cent. control by this means. They also proved that unusually mild winters greatly favour hibernating larvae in both ploughed and unploughed stubble.

List (G. M.). **The Mexican Bean-beetle.**—*Colorado Agric. Expt. Sta., Fort Collins*, Bull. 271, August 1921, 58 pp., 11 figs., 19 tables. [Received 23rd June 1922.]

Epilachna corrupta, Muls. (Mexican or spotted bean-beetle) is a very serious pest of the bean crop in the infested sections of Colorado. Its attacks are confined almost entirely to the true beans. Hibernation is passed in the adult stage, the insects emerging during the middle and latter part of June. In Fort Collins there is one complete generation, and in some seasons about 25 per cent. of the first-brood adults deposit second-brood eggs, and second-brood larvae are often quite abundant. A few individuals pass through a second complete life-cycle, emerging as adults late in the autumn. The numbers of the second generation are small compared with the first, the percentage being greater in the warmer sections of the State. Their mortality is high, and the larvae do little damage. The maximum period of injury usually occurs during the end of July and in August.

Under certain conditions hand-picking of the hibernated adults and first-brood eggs may be practised. The most satisfactory remedial measure is spraying with zinc arsenite or lead arsenate at the rate of 1 lb. of powder to 40 U.S. gals. water, using 50 U.S. gals. water in the case of zinc arsenite. The spray should be applied to the lower surface of the leaves, and as many as three applications may be necessary. Beans are very susceptible to injury from arsenical sprays, zinc arsenite causing the least amount of injury, though that from lead arsenate has not been serious enough to make its use impracticable. Only beans of the dwarf or bunch type should be grown. Early planted beans of an early maturing variety are most easily protected, and are usually most successful in badly infested sections.

DUPORT (L.). **Rapport sur quelques Recherches poursuivies à la Station Entomologique en Octobre et Novembre 1921.**—*Supplement to Bull. 133, Chambre d'Agric. Tonkin & Nord-Annam, Hanoi,* no. 14 bis, October–November 1921, 1922, 4 pp. [Received 24th June 1922.]

The breeding of parasites has been continued [*R.A.E.*, A, x, 384], though in many cases greatly hampered owing to adverse weather conditions. Over 400,000 individuals of *Doryctes strioliger*, Kieff., were liberated during October. The work in connection with this Braconid during the year may be considered to be satisfactory on the whole.

Owing to the satisfactory reproduction of *Sclerodermus domesticus*, Latr., 12,000 individuals were distributed as against 4,000 in 1920. This is a more hardy species than the Braconid and destroys all stages of *Xylotrechus quadripes*. Experiments are now in progress with a view to breeding this species under artificially heated conditions so as to enable it to be liberated during the winter.

Various substances have been tried as repellents against *X. quadripes*, but they did not prevent it from ovipositing on the treated plants. In many cases the larvae were poisoned by this treatment immediately after hatching, but further observations are needed to prove its efficacy.

Recent observations on rice pests confirm those made earlier. The early maturing varieties appear to be less subject to attack than later ones, the loss due to insects in the former amounting to from 0·5 to 3 per cent. whereas in the latter it may reach 50 per cent.

Schoenobius incertellus, Wlk., is still the most important pest of this crop, and apparently it can only be kept in check by drainage and irrigation.

DUPORT (L.). **Rapport sur quelques-uns des Travaux poursuivie à la Station [Entomologique de Cho-Ganh] en Octobre, Novembre et Decembre 1921 et en Janvier 1922.**—*Supplement to Bull. 134, Chambre d'Agric. Tonkin & Nord-Annam, Hanoi,* no. 15, 1922, 2 pp. [Received 24th June 1922.]

Laboratory work in connection with the breeding of *Doryctes strioliger*, Kieff., and *Sclerodermus domesticus*, Latr., parasites of *Xylotrechus quadripes*, Chevr., for the months of October to December 1921 and for January 1922, is briefly described.

LIENHART (R.). **Un Orthoptère Phasgonuridae nouveau pour la Faune de la Lorraine.**—*C.R. Soc. Biol., Paris,* lxxxvii, no. 22, 17th June 1922, pp. 175–176.

Ephippigerida ephippiger, Fieb. (*vitium*, Serv.), which is common in the south of France, is recorded from Lorraine, and is probably at its northernmost limit there.

Reports on the State of Crops in each Province of Spain on the 20th of May 1922.—*Bol. Agric. Téc. y Econ., Madrid,* xiv, no. 161, 31st May 1922, pp. 431–447.

In Huesca nearly all the early-sown wheat was injured by a fly, believed to be *Mayetiola* (*Cecidomyia*) *destructor*. In the same province olives were attacked by the olive fly [*Dacus oleae*] and by the olive

borer [*Phloeotribus oleae*]. In Palencia, *Haltica ampelophaga* infested vines to such a degree as to make official measures necessary. *Aglaope infausta* infested fruit-trees in Zamora, and *Phylloxera radicicola* and *Mayetiola destructor* occurred in Saragossa.

GALLI-VALERIO (B.). **Parasitologische Untersuchungen und Beiträge zur parasitologischen Technik.** [Parasitological Researches and Technique.]—*Centralbl. Bakt. Paras. Infektionskr., Jena*, IIte. Abt., lvi, no. 14–16, 20th June 1922, pp. 344–347.

The larvae of *Anthrenus scrophularíae*, L., were found to resist starvation for ten months. *Calandra granaria* survived a fast of two months.

In 1921, grasshoppers, *Arcyptera* (*Stethophyma*) *fusca*, Pall., died in large numbers in the Canton of Valais of an epizootic, probably due to a heavy intestinal infestation by a Gregarine, apparently a variety of *Gregarina acridiorum*, Léger.

BAUDYŠ (E.). **O hrbáči osenním či střevlci obilním.** [On *Zabrus gibbus*.]—*Časopis Českoslov. spolecn. entomol.*, xvii, 1921, pp. 32–34. (Abstract in *Centralbl. Bakt. Paras. Infektionskr., Jena*, IIte. Abt., lvi, no. 14–16, 20th June 1922, pp. 350–351.)

The larvae of the Carabid, *Zabrus gibbus* (*tenebrioides*), do most harm at the edges of fields. The damage is more severe on heavy ground than on sandy soil, and is most marked where one grain crop follows another. The adult beetles live until the following spring; according to the author they are diurnal as well as nocturnal, and can be found feeding on tender grain in broad daylight. Towards autumn they attack the young seed just as the larva does. Preventive measures are the rotation of crops—peas, potatoes, etc., being grown as well as grain; thorough harrowing in autumn or spring; and manuring with crushed kainit before rain or with kainit dissolved in liquid manure.

SAVASTANO (G.). **L'Agrumicoltura sorrentina durante il Periodo 1915-1921.** [Citrus Cultivation in the Peninsula of Sorrento from 1915 to 1921.]—*Ann. R. Staz. Speriment. Agrum. e Frutic., Acireale*, v (1919–21), 1922, pp. 160–185, 6 plates.

The following insect pests of *Citrus* occurred in the Peninsula of Sorrento during 1915–21:—*Lepidosaphes beckii*, Newm., which was found in all the plantations, but never attained serious proportions; *Aspidiotus hederae*, Vall., which has spread considerably of recent years, sometimes attacking the fruit severely; *Chrysomphalus dictyospermi*, Mask., which has spread slightly; *Pseudococcus citri*, Riss., which has increased to some extent, especially in sheltered situations, but is not of continuous occurrence, as it is destroyed in cold years; *Icerya purchasi*, Mask., which has been observed intermittently, its enemies—*Novius cardinalis*, Muls., and *Chilocorus bipustulatus*, L.—being also seen; *Saissetia oleae*, Bern., which is found occasionally, many of the scales being parasitised by *Scutellista cyanea*, Mot.; and *Toxoptera aurantii*, Boy. (lemon aphis), which occurs frequently but is not abundant.

Plant Pest Campaigns.—*Cyprus : Ann. Rept. Director Agric., 1921, Nicosia,* 1922, p. 4.

During 1921 campaigns were conducted against *Zygaena ampelophaga*, and about 2,650 apple and plum trees were sprayed, as they were attacked by the ermine moth [*Hyponomeuta*]. The potato moth, *Phthorimaea operculella* (*Lita solanella*) was much reduced in numbers, but measures were again carried out against it on the same lines as in the last three years.

Dutton (W. C.) & Johnston (S.). **Dusting and Spraying Experiments of 1920 and 1921.**—*Michigan Agric. Expt. Sta., East Lansing,* Spec. Bull. 115, March 1922, 54 pp., 23 figs. [Received 26th June 1922.]

The continuation of the work previously noticed [*R.A.E.*, A, ix, 18] is recorded, and the comparative value of dusting and spraying against apple and pear pests during 1920 and 1921 is discussed, no definite conclusion being reached in most cases. Peach tree borer [*Aegeria exitiosa*, Say] was effectively controlled by para-dichlorobenzene when situated low enough to be properly treated, but those that were high up on the trees escaped.

Strawberry Plant Inspection discontinued in Florida.—*Qtrly. Bull. Florida State Pl. Bd., Gainesville,* vi, no. 3, April 1922, p. 90.

The State Plant Board of Florida has repealed the rule requiring the inspection and certification of Florida-grown strawberry plants before movement, though this is still required for strawberry plants coming into Florida from other States.

Boyden (B. L.). U.S. Bur. Ent. **The Sweet Potato Weevil in Florida.** —*Qtrly. Bull. Florida State Pl. Bd., Gainesville,* vi, no. 3, April 1922, pp. 76–87, 2 figs.

The sweet potato weevil, *Cylas formicarius*, and the type of injury it causes are described for the purpose of enabling growers to recognise this pest and report upon its occurrence. An account is given of the eradication work that has been in progress in Florida during recent years. The remedial methods used during 1922 have been practically the same as those previously noticed [*R.A.E.*, A, x, 281].

Simmonds (H. W.). **A Leaf-destroying Moth of Coconuts in Fiji,** *Agonoxena argaula*, **Meyr.**—*Agric. Circ., Fiji Dept. Agric., Suva,* iii, no. 1, January–March 1922, pp. 7–8. [Received 26th June 1922.]

The moth, *Agonoxena argaula*, Meyr., is a common pest of coconuts throughout Fiji, its injuries probably reducing the yield to a considerable extent. The adults can frequently be found lying along the midrib of the coconut leaflets during the daytime. Eggs have not been observed, but are probably laid singly, and the young larva feeds under a loose web, which it spins on the lower surface of the leaves, eating away patches of the green portion and leaving only the epidermis, which subsequently turns brown. Pupation occurs in a cocoon either along the rib of a leaflet of coconut or of some low plant growing near, or upon a blade of grass, and lasts about ten days. In the case of bred larvae fifty per cent. were parasitised, a Chalcid and a Braconid being concerned. The latter may be a hyperparasite.

Haviland (M. D.). **On the Larval Development of** *Dacnusa areolaris* **Nees (Braconidae), a Parasite of Phytomyzinae (Diptera), with a Note on certain Chalcid Parasites of Phytomyzids.**—*Parasitology, Cambridge*, xiv, no. 2, June 1922, pp. 167–173, 5 figs.

Phytomyza angelicae, Zett., mines in the leaves of *Angelica campestris*, each mine usually containing only one larva. When fully fed it leaves the leaf by a slit and falls to the ground for pupation, which lasts from 19 to 25 days. In captivity eggs were laid a few hours after emergence of the adult, the latter living only one or two days. In the neighbourhood of Cambridge about sixty per cent. of this Phytomyzid were found to be parasitised by the Braconid, *Dacnusa areolaris*, Nees. Apparently only the early stages of the larva are infested. Epiparasitism (double infestation) [*R.A.E.*, A, x, 273] does not seem to occur in this species. About thirty-six hours after the host has formed its puparium, the parasite throws off the trophic membrane in which it is contained and feeds on the viscera of the host, taking about a week to demolish it. After that it lies free in the puparium where metamorphosis takes place. Pupation lasts about two weeks, the development of the parasite being very closely related to that of the host. Adults lived for 5–6 days in captivity when fed on sugar and water.

Certain Chalcids of the genera *Eulophus* and *Chrysocharis* are ectoparasites of *P. angelicae*, the host dying soon after the parasite begins to feed. Transformation takes place within the blister on the leaf, the pupal period lasting about four weeks.

Contra la Mosca del Olivo. [Against the Olive Fly.]—*Rev. Inst. Agric. Catalán S. Isidro, Barcelona*, lxxi, no. 6, June 1922, p. 98.

The Lotrionte method [*R.A.E.*, A, ii, 289, 452] against the olive fly [*Dacus oleae*] is being made use of to an increasing extent in Spain. Near Tarragona about 11,000 trees are to be treated, while the authorities at Barcelona are adopting it in several localities, and it is expected that in a few years the entire olive crop will be saved there. In one township about £240 has been earmarked for this purpose.

Müller (K.) & Rabanus (A.). **Ein grosser Fortschritt in der Schädlingsbekämpfung?** [A great Advance in Pest Control?]—*Angew. Botanik*, iii, 1921, pp. 145–148. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, pp. 38–39.)

Urania green has been recommended in block form [*R.A.E.*, A, ix, 611], but some of its disadvantages, apart from its enhanced price, are the slight degree of suspension when dissolved in water, a precipitate of coarse particles, with little adhesiveness, soon settling at the bottom of the liquid.

Reichert (A.). **Entomologisches aus Miltitz 1918.** [Entomological Notes from Miltitz in 1918.]—*Rosenztg., Karlsruhe*, xxxv, 1920, pp. 28–31, 42–43. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, p. 66.)

This paper enumerates the rose pests observed in 1918 on *Rosa damascena*, with biological data. The larvae of the moth, *Incurvaria morosa*, Z., infested the buds, the adults appearing in May.

Insects beneficial to rose bushes are also dealt with.

MÜLLER (H. C.) & MOLZ (E.). **Versuche zur Ermittlung des Wirkungswertes verschiedener Stoffe zur Bekämpfung der Rübennematoden in Schlammerden.** [Experiments to determine the Efficacy of various Substances against the Beet Nematode in Mud Soils.] —*Blätter f. Zuckerrübenbau*, xxviii, 1921, pp. 96–102, 144–149. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, p. 63.)

Methods for disinfecting mud soils have hitherto given unsatisfactory results because the brown cysts of *Heterodera schachtii* are not killed by the substances used. New experiments show that formaldehyde at 0·25 per cent. gives a good result after 20 days, while one application of 0·1 per cent. sufficed with 40 days. The caustic alkalinity produced by lime water 0·12 per cent. required 60 days to kill the Nematodes and their brown cysts.

LA BAUME (W.). **Die Geradflüglerfauna Westpreussens. Dritter Beitrag zur Kenntnis der westpreussischen Ohrwürmer und Heuschrecken. Dermaptera und Orthoptera.** [The Orthopterous Fauna of West Prussia. Third Contribution to the Knowledge of West Prussian Earwigs and Grasshoppers.]—*Schrift. naturf. Ges. Danzig.* N.S., xv, no. 3, 1920, pp. 144–185. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, p. 66.)

A locust, native to West Prussia, *Locusta migratoria* ph. *danica* (*Pachytilus danicus*, L.), has caused most of the damage there; *L.* (*P.*) *migratoria*, from South Russia, has also occurred in abundance. *Tachycines asynamorus*, Adelg., sometimes occurs in greenhouses.

DRENOWSKI (A. K.). *Macrolophus costalis*, **Fieb. Ein neuer Insektenschädling auf den Tabakpflanzen in Bulgarien.** [*M. costalis*, a new Insect Pest of Tobacco in Bulgaria.]—*Rev. Inst. Recherches Agronomiques en Bulgarie, Sofia*, i, 1920, pp. 180–188, illustr. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, p. 67.)

Since 1912, a bug, *Macrolophus costalis*, Fieb., has occurred on tobacco on the northern slope of the Rhodope mountains. It always occurs together with *Thrips communis* on the veins of the undersurface of the leaves. When they are harvested the larvae remain on them and transform on the drying leaf, with the result that many fertilised females hibernate in dwellings or sheds and oviposit in spring on cuttings, with which they are re-introduced to the fields.

MOKRÝ (—). **Pravé příčiny rozmnozené kbeyně-minšky ve strední Evropě v posledních letech.** [The true Reasons for the Increase of the Nun Moth in Central Europe in Recent Years.]—*Spolkový časopis pro lesn., mysliv. a přírod., Prague*, 1920–21, pp. 37–41. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart*, xxxii, no. 1–2, 1922, p. 72.)

Since 1895 only three severe winters (1895–96, 1900–01, 1901–02) have occurred, and from 1911–12 onwards the winters have been unusually mild. Owing to the few insects hibernating, birds, which are normally the chief destroyers of the eggs and larvae of the nun

moth [*Liparis monacha*], have therefore had an abundance of other insect food, and this pest has been able to increase at altitudes below 2,300 ft. Above this level hibernation always occurs.

Ext (W.). **Beiträge zur Kenntnis des Rapsglanzkäfers,** *Meligethes aeneus,* **Fabr.** [Contributions to a Knowledge of the Rape Beetle, *M. aeneus.*]—*Arch. f. Naturgeschichte,* lxxxvi, 1920, Abt. A, no. 9, 36 figs., 1 plate. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart,* xxxii, no. 1–2, 1922, p. 75.)

This is a morphological and systematic study of *Meligethes aeneus,* F., to which more attention is being paid in view of the increase in rape cultivation in Germany.

Börner (C.) & Blunck (H.). **Zur Kenntnis des Kartoffelerdflohs.** [On the Potato Flea-beetle.]—*Der Kartoffelbau,* iii, no. 16, 1919. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart,* xxxii, no. 1–2, 1922, p. 76.)

A description of *Psylliodes affinis* and of its biology is given.

Salmen (J.). **Eine gegen die Blutlaus unempfindliche Apfelsorte.** [A Variety of Apple immune to the Woolly Aphis.]—*Wiener landw. Ztg.,* lxi, 1921, p. 269. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde, Stuttgart,* xxxii, no. 1–2, 1922, p. 81.)

The Zuccalmaglio-Reinette is a variety of apple that is immune to the woolly aphis [*Eriosoma lanigerum*]. This character is most noticeable in grafted trees, the bark below the graft being infested, while the grafted portion is quite free.

Gardner (M. W.) & Kendrick (J. B.). **Overwintering of Tomato Mosaic.**—*Bot. Gaz., Chicago, Ill.,* lxxiii, no. 6, June 1922, pp. 469–485, 1 plate.

Mosaic disease has been found in the field in Indiana on *Physalis subglabrata, P. virginiana, P. heterophylla* and *Solanum carolinense,* and has been transmitted to tomato from each of these perennial weeds. The virus persists in the rootstocks of *P. subglabrata* throughout the winter, and diseased shoots appear in the spring before tomatos are planted out in the field. The virus persists year after year in these weeds, but does not occur spontaneously; it only appears on *Physalis* in or near fields once used for tomatos.

Preliminary tests indicate the possibility of transmission by Aphids and flea-beetles. To prevent the occurrence of the disease, all perennial Solanaceous weeds in and near tomato fields, and especially the plant beds, should be destroyed early in the season.

Zacher (F.). **Die Feinde der Syringen.** [The Enemies of Lilac.]—Reprint from *Die Gartenwelt, Berlin,* xxvi, no. 21, 1922, 4 pp., 4 figs.

Of the more important pests of lilac, *Gracilaria syringella,* F., does the most noticeable injury, the second generation being the more harmful. The moth emerges in May from the pupae that have hibernated in the ground and oviposits on the developing leaves. The larvae are gregarious and cause large, blister-like mines that curl irregularly.

Though they are attacked by eight species of Hymenopterous parasites, they sometimes increase to such an extent that all lilac bushes in a district may be disfigured.

The chief measure consists in picking and burning infested leaves. In winter the pupae may be exposed by breaking up the surface of the soil. A carbolineum spray, applied before the leaf-buds open, may perhaps prevent oviposition. Other food-plants include ash and spindle-tree [*Euonymus*].

Lytta vesicatoria, L. (Spanish fly) does less conspicuous injury, but the damage done by this beetle is balanced by its commercial value, which makes collection remunerative.

A mite, *Eriophyes loewi*, Nal., is responsible for checking the development of the leaf-buds and deforming them. The infestation spreads rapidly. The best remedy consists in removing and immediately burning the deformed shoots in autumn, winter or early spring. The bushes thus treated must be watched for several years for a recurrence of infestation. Lime-sulphur, colloidal sulphur or sulphur dust are likely remedies that require testing.

ZACHER (F.). **Eingeschleppte Vorratsschädlinge. Gefahren für unser Wirtschaftsleben.** [Imported Pests of Stored Products. Dangers to our Economic Life.]—Reprint from *Die Umschau, Frankfurt a. M.*, xxvi, no. 5, 1922, 4 pp.

Few insects occurring in the field in Germany are pests of stored products, most of the latter being of foreign origin. *Ephestia kühniella*, Zell., recorded from Mexico and Guatemala in 1881, appears to be indigenous there. *Niptus hololeucus*, Fald., a pest of woollen goods, has its home on the shores of the Black Sea. *Ptinus tectus*, Boield., comes from Tasmania, and has reached Germany so recently that its economic importance there has not yet been ascertained. With regard to *Rhizopertha dominica*, F., the author's experience is that Australian wheat is generally less infested than that from Argentina, and, more especially, that from India. Other introductions include *Caulophilus latinasus*, Say, imported with Mexican maize, a rice beetle, *Latheticus oryzae*, Wat., and a rice moth, *Corcyra cephalonica*, Stt.

H.S. **Zur Sauerwurmbekämpfung.** [On Measures against the Second Generation of Vine-moths.]—*Schweiz. Zeitschr. Obst- u. Weinbau, Frauenfeld*, xxxi, no. 14, 15th July 1922, pp. 217-219.

In Switzerland outbreaks of the first generation of the vine moths [*Clysia ambiguella* and *Polychrosis botrana*] were local in 1922. Against the second generation, which causes heavier losses owing to direct injury being aggravated by the damage due to rotting grapes, etc., spraying is best undertaken when the larvae are still so small as to be scarcely visible. As many growers do not ascertain the date of the flight period, these measures are rarely taken, and collection must be resorted to as soon as the damage becomes apparent.

Vernichtet die Kohlweisslingseier und Raupen. [Destroy the Eggs and Caterpillars of the Cabbage Butterfly.]—*Schweiz. Zeitschr. Obst- u. Weinbau, Frauenfeld*, xxxi, no. 14, 15th July 1922, pp. 219-220.

Since the heavy infestation of 1917 [*R.A.E.*, A, vii, 235], the cabbage butterfly [*Pieris brassicae*] has become scarce in Switzerland owing

to the action of Hymenopterous enemies. There are, however, indications that conditions are again becoming favourable to it, and the slight infestation now present should be dealt with by crushing the eggs and larvae on the leaves.

Faes (H.) & Tonduz (P.). **Station fédérale d'Essais viticoles à Lausanne et Domaine de Pully. Rapport annuel-1921.**—*Ann. Agric. Suisse, Berne*, xxiii, no. 2, 1922, pp. 203–215.

The value of pyrethrum-soap solution against the vine moth [*Clysia ambiguella*] is pointed out [*R.A.E.*, A, x, 231]; experiments with other substances have also been continued during 1921. Arsenical salts proved to be of undoubted value against *Cydia* (*Carpocapsa*) *pomonella*.

Other pests recorded for the year include larvae of *Tipula oleracea* and *Polychrosis* (*Eudemis*) *botrana*, which was particularly abundant owing to the favourable temperature conditions.

De Stefani (T.). **Di qualche Insetto dannoso.** [On some Injurious Insects.]—*Il Rinnovamento Econ.-Agrar., Trapani*, xvi, nos. 5–6, May–June 1922, pp. 65–69, 92–95.

The more important insect pests of the apple in the province of Trapani, Sicily, are *Hyponomeuta malinellus*, Z., *Rhynchites bacchus*, L., and a bug, *Piezodorus incarnatus*, Germ. As regards the last-named, no biological data are available.

During a severe infestation of *H. malinellus* the caterpillars dropped from their webs when wetted by a spray, and many were killed by burning as they hung suspended. It is suggested that a nicotine spray as soon as the larvae hatch will prevent any serious injury. Very few parasites were obtained from a large number of larvae. They included *Pimpla roborator*, *Limnerium fuscipes*, *L. velox*, and a Mymarid, perhaps *Anagrus atomus*, Hal., or *A. ovivorus*, Rond.

Bogdanov-Katkov (N. N.). **Хреновый Листоед или Бабануха** (*Phaedon cochleariae*, F.).—**Петроградская С.Х. Академия. Энтомологический Отдел Николаевской Опытной Станции.** [*Petrograd Agric. Acad., Ent. Div. Nikolaev Expt. Sta.*], *Petrograd*, 1922, 82 pp., 2 plates, 88 figs.

A detailed account is given of the systematic position, anatomy, and morphology of *Phaedon cochleariae*, F.

Its life-history and economic importance and the remedies for it have already been noticed [*R.A.E.*, A, ix, 350].

Gilmour (N.). **The Economic Value of Birds.**—*16th Ann. Rept. Saskatchewan Dept. Agric., 1920–21, Regina*, 1921, pp. 88–97. [Received 3rd July 1922.]

The importance of protecting bird life in Canada is urged. When it is realised that, while insects consume daily more than their own weight of vegetable growth, young birds consume daily their own weight of insects, the inestimable value of the commoner insectivorous birds becomes obvious. The Franklin gull is a voracious feeder on grasshoppers, in search of which it invades cultivated lands.

TULLIS (M. P.). **Brief History of Grasshopper Outbreak in Saskatchewan, 1918-20, inclusive.**—*16th Ann. Rept. Saskatchewan Dept. Agric., 1920-21, Regina,* 1921, pp. 69–76, 1 fig. [Received 3rd July 1922.]

An account is given of the grasshopper outbreaks in Saskatchewan in 1918–20 and of the measures taken to deal with them [*R.A.E.*, ix, 147, 259, 541, etc.].

PENNY (D. D.). **A Catalog of the California Aleyrodidae and the Descriptions of Four New Species.**—*Jl. Ent. & Zool., Claremont, Cal.*, xiv, no. 2, June 1922, pp. 21–35, 4 figs.

A list of the previously described Aleurodids of California is given, with records of their food-plants and localities.

The new species described are: *Aleurodes essigi* on *Ulmus* sp.; *Asterochiton corollis* on *Arctostaphylos manzanita*; *A. diminutis* on tarweed (*Chamaebatia foliolosa*); and *Tetraleurodes herberti* on black locust [*Robinia pseudacacia*].

FLEBUT (A. J.). **Controlling the Achemon Sphinx Moth.**—*Associated Grower*, ii, no. 8, 1921, p. 11. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlvi, no. 7, May 1922, p. 658.)

An application of a spray consisting of lead arsenate paste 10 lb., atomic sulphur 24 lb., ground glue 1 lb., and water 200 U.S. gals., applied at a pressure of about 250 lb., started on 16th May and completed on 9th June, resulted in the prevention of injury by the achemon sphinx moth [*Pholus achemon*] in a large vineyard in California.

MOZNETTE (G. F.). **Notes on a destructive Lawn Insect.**—*Florida Grower*, xxiv, no. 22, 1921, p. 13. (Abstract in *Expt. Sta. Record, Washington, D.C.*, xlvi, no. 7, May 1922, p. 659.)

Crambus haytiellus, Zinck., was a source of considerable injury to lawns in Florida during the spring and early summer of 1921. The grasses attacked included Bermuda grass (*Cynodon dactylon*) and Japanese grass (*Zoysia japonica*), the injury being particularly severe to the latter. The tubes containing the larvae are located in the thickly massed grass roots and runners either on or just below the surface of the soil, where they feed upon the grass with which they come in contact. Preliminary tests made with several insecticides indicate that good results may be obtained from the use of tobacco dust applied with a dust gun. Where lawns were thus treated the larvae were either killed or they migrated from the dusted area.

FULLAWAY (D. T.). **Insect Problems of the Pineapple Industry.**—*Hawaiian Forester & Agric., Honolulu*, xix, no. 1, January 1922, pp. 5–12. [Received 4th July 1922.]

Many of the most important pineapple pests of other countries are absent from Hawaii. Those that occur include the mealybug [*Pseudococcus bromeliae*], which is also found on sugar-cane, bananas, grass roots and some other plants. It is generally found in clusters at the base of the fruit or leaves. Enemies that keep its numbers down are the Coccinellids, *Cryptolaemus montrouzieri* and *Scymnus bipunctatus*.

The pineapple scale [*Diaspis bromeliae*] seems to be confined to the pineapple and is generally seen on the leaves. There are four generations annually. Its parasites include *Aphelinus* spp. and *Aspidiotiphagus citrinus*, and predacious Coccinellids also destroy some of the scales. The chief injury caused by these Coccids is the puncturing of the epidermis, which allows the entrance of certain parasitic fungi to which the pineapple is particularly susceptible. The ants that are attracted to the trees by the scales also cause damage by invading the roots, and still more by their habit of building coverings of soil over the Coccids, thus causing lack of evaporation and subsequent collection of moisture on the surface of the fruit, encouraging decay and rot.

Experiments have recently been made with various contact insecticides, such as nicotine dust, tobacco decoction, nicotine sulphate in water or with sulphur and an inert dust, or kerosene or distillate emulsified oil with soap. Each of these gave more or less success, but none cleared the plants completely. Tobacco decoction with soap seemed the most successful, and might with advantage be applied in conjunction with iron sulphate treatment. When dusts were used, it was necessary to limit the quantity placed in the heart of the plant, particularly during cold, wet weather, in order to avoid encouraging rot. Insecticide treatment should be applied at regular intervals throughout the growth of the plant.

The pineapple mite, *Stigmaeus floridanus*, which was probably imported from Florida, is apparently also confined to pineapple, where it infests the base of the leaves, and inflicts wounds that admit fungus spores. The mites are not easily reached by insecticides. Sulphur is generally the most effective, either as a fine dust or in liquid lime-sulphur. The results of fumigation have proved disappointing as regards mites.

Minor injury is done to pineapple by a common species of grasshopper and by the larvae of a ground beetle. Fruit beetles, which are usually merely scavengers, became a serious trouble during the last packing season. It is pointed out that when old ratoon fields are allowed to become overgrown and rubbish accumulates on them, the insect population increases rapidly and becomes a menace to surrounding fields.

EHRHORN (E. M.). **Report of the Chief Plant Inspector, November and December 1921.**—*Hawaiian Forester & Agric., Honolulu*, xix, nos. 1 & 2, January & February 1922, pp. 19–20 & 53–55 [Received 4th July 1922.]

The pests intercepted at Honolulu during November and December 1921 were: From China, *Bruchus chinensis* in beans, *Parlatoria zizyphi* on pomelo, and *Aphis* sp. on *Caladium* and on sweet potatoes. From Japan, weevils in dried chestnuts, and Drosophilid maggots in horse-radish. From the United States, *Chionaspis* sp. on cypress, and *Aspidiotus rapax*, *Lepidosaphes ulmi* and *Coccus hesperidum* on a package of plants.

RENNIE (J.). **Notes on Acarine Disease.**—*Bee World, Benson, Oxon.*, ii, no. 12, May 1921, pp. 144–145; iii, nos. 1–12, June 1921–May 1922, pp. 5–7, 35–36, 66–67, 95–96, 115–117, 145–146, 180–182, 204–206, 219–221, 237–239, 262–263, 285–287, 17 figs.

The nature of acarine disease of bees is explained. The progressive weakness, which affects the whole body of the bee, is primarily due to

continuous loss of blood resulting from the feeding of the mite, *Acarapis (Tarsonemus) woodi*. The blocking of the air tubes restricts the supply of oxygen, and leads to considerable deterioration of various tissues, this injury being of a secondary character. While many of the mites remain within the tracheae of the bee, many females after fertilisation pass to the outside of the host, where they may easily be rubbed on to other bees by contact, and this is probably the greatest source of infection. These migrating females invariably find their way to one of the first pair of thoracic spiracles, which they enter, and generally begin to oviposit near the entrance to the tube, all stages subsequently being found all along the tracheal system of that part of the body, as far as the diameter of the tube will allow the mites to pass. Evidence all tends to show that the disease is almost entirely a contagious one, carried by the living bee. The crawling symptoms in acarine disease are periodic, especially in summer, while new bees are being produced in large numbers, for although a proportion of these may become infected early in their adult life, they continue to fly and work for a considerable time. During this time crawling may be practically absent, and a false impression of recovery from the disease is often conveyed. The saving of the queens of affected stocks is not recommended, as a large percentage of them is often found to be infested with the parasite.

Only adult bees have been found to be infested, and it has been noticed that the note emitted in flight by an infested worker differs from the normal, resembling rather that of the drone. The disease may sometimes be detected by this means. The main contributing factors affecting the course of the disease are discussed, such as the importance of a good queen, the advantage of numerous workers, etc. Regarding what has been said and written of races of bees immune from acarine disease, the author does not admit that there is any evidence that such a race exists, nor does he think that any race would be immune unless one could be bred with spiracles too small to admit the mite to the respiratory system ; he suggests that the production of vigorous and fertile races is the best antidote to acarine infection.

A. woodi breeds all the year round, and infective migrations from bee to bee are continuous throughout the year. Winter is, however, a critical period, all the circumstances favouring a steady increase of the disease, and either the stock will not survive the winter, or it will survive with a high proportion of infected and weakened bees. This mortality is somewhat counteracted by the fact that the normal longevity of the bee is much greater in winter than in summer. Beekeepers are urged to estimate carefully the prospects and general risks before deciding to spend time and money in feeding a colony up for the winter, and the keeping of winter stocks known to be diseased is deprecated.

Besides the method of infection described above, there are numerous outside sources of infection, such as robber bees, drones, drifting bees, or casual individuals entering a wrong hive. By these means, especially if they occur together, the disease may reach a critical stage very quickly and in a large number of bees at the same time, and crawling may be sudden and extensive. Mass crawling is also brought about sometimes by the swarming of bees already weakened by disease. When large numbers are known to be crawling in the immediate vicinity of healthy stocks, the presence of a few crawler traps in the apiary is recommended, until the cause of the crawling is ascertained. If it is known to be due to acarine infection, grass harbouring crawling

bees should be cut close, raked and burnt. Sprinkling the site with some repellent substance, such as naphthaline, will prevent healthy bees from alighting. After crawling has ceased, the site does not long remain dangerous, for the mites do not live long away from the living bee, and have never been found in dead bees, except in those recently dead.

The various stages in the life-history of *A. woodi* are described and illustrated. It is evident, from the observation of many colonies, that in some cases the mite may gain a footing among a stock of bees and subsequently disappear. As in the past the disease has only been recognised after it was irretrievably established, these cases of elimination of the parasite from stocks were unknown, thus leading to an erroneous idea regarding the gravity of the disease. A warning is given against hasty identification of bee-mites, as many species occur; no mite that is visible to the naked eye can be *A. woodi*. Certain characteristics that may help in the identification of *A. woodi* under the microscope are briefly described, as well as the structure of the thorax of the bee and the method of examination of the bee for diagnosis. The spiracles leading to the tracheae are provided with a blocking plate by means of which the bee can at least partly close the tubes. As great difficulty has been experienced in endeavours to kill the mites within the respiratory system by means of acaricides, it would seem that the bee finds such substances offensive or irritant and endeavours by closure to keep them out.

As it is known that *A. woodi* may be present in a colony for some time before visibly affecting its prosperity, the early recognition of its presence is of extreme importance. It is suggested that county agricultural authorities should undertake to make scientific examination of stocks and to report upon their condition, beekeepers, either singly or in combination, engaging the services of a qualified expert to certify as to the condition of their stocks. The results of experiments on the vitality of *A. woodi* are given. The majority of mites are generally dead in 24–30 hours after the death of the host, but individuals have been found alive after five days.

Alfonsus (A.). **An Enemy of the Mites in the Bee-hive.**—*Bee World, Benson, Oxon.*, iv, no. 1, June 1922, pp. 2–3, 1 fig.

Chelifer cancroides (the book-scorpion), which generally lives in old books, herbariums, entomological collections, etc., occurs sometimes in beehives, where it doubtless lives on the many species of mites to be found there. The author suggests that this Arachnid may prove to be of practical value in the control of acarine disease of bees.

Dr. J. Rennie, in commenting upon this paper, confirms the occurrence of *C. cancroides* in beehives, although it is very rare, and thinks that it is only in hives that are badly kept, and where damp, débris and dead bees are common features, that there are likely to be sufficient mites to furnish food for any number of it.

Box (H. E.). **Insect Pests of Stored Products. The Bean Weevil (*Bruchus obtectus*, Say).**—*Farmers' Jl., Nairobi*, iv, nos. 23 & 24, 8th & 15th June 1922, pp. 29–30, 15–22, 19 figs.

This is the first of a series of papers dealing with pests of stored products in Kenya. The life-history and habits of, and injury caused by, *Bruchus obtectus*, Say, are given in detail, much of the information

being quoted from previous authors. The remedial measures recommended are fumigation with carbon bisulphide or hydrocyanic acid gas. The Bruchids may also be destroyed by raising the temperature to 140° F. for two minutes or immersing infected beans in two parts of boiling water to one part of cold for five minutes. This method does not injure the seed. Infestation may be prevented by clean cultivation and clean storage.

SCHLUPP (W. F.). **Cetonid Beetles.**—Reprint from *S. African Fruit Grower* [*sine loco*], May 1922, 3 pp. [Received 4th July 1922.]

Cetoniid beetles are very common in most parts of South Africa, the two most destructive being *Pachnoda impressa* and *P. cincta.* In orchards, ripe apricots and peaches are first attacked, and grapes and plums also suffer; pomaceous fruits are less severely damaged. In gardens, rose petals are very much eaten. Breeding occurs in manure heaps, in accumulations of vegetable matter and in soil rich in humus. Eggs are deposited about an inch below the surface in January (under laboratory conditions) and hatch in from 15–18 days. The larvae feed on vegetable matter for several weeks, and construct pupal cells in June, where they remain until about the end of September before pupating. After a pupal period of 25–28 days the adults remain in the cells until late October or November.

Spraying has given very poor results, and to be at all effective would have to be applied only a short time before the fruit is gathered. Covering the trees with mosquito or other netting is a good plan with valuable trees, and poultry will devour many of the beetles, especially if the trees are jarred at intervals. Hand collection is one of the most efficient remedial measures, and is best done by jarring the beetles into a net on the end of a pole. As the beetles always attack the ripest fruit, a good deal of injury can be avoided by picking it while it is slightly green.

Northern Rhodesia: Government Notice No. 79 of 1922.—*N. Rhodesia Govt. Gaz., Livingstone,* no. 177, 6th July 1922, p. 73.

Under the above notice, dated 29th June 1922, Government Notice No. 44 of 1922 is cancelled and the provisions of Government Notice No. 34 of 1919 revived [*R.A.E.*, A, x, 294]. Citrus trees or parts thereof may not therefore be imported from any part of South Africa until further notice.

HALL (W. J.). **The Hibiscus Mealy Bug,** *Pseudococcus hibisci* **(Hemip.).** *Bull. Soc. Ent. d'Egypte, Cairo,* xiv (1921), 1922, pp. 17–29.

Phenacoccus hirsutus, Green (hibiscus mealybug) has recently been the cause of much damage in Cairo, having doubtless been introduced from India, where it is a well-known pest [*R.A.E.*, A, ix, 74, 75]. It was at first mistaken for a new species, for which the name *Pseudococcus hibisci* was proposed. Wind is undoubtedly the chief distributing agent. It is almost a universal feeder, preferring old or damaged trees. Its food-plants include *Hibiscus*, *Morus* spp., *Albizzia lebbek*, *Bauhinia* spp., *Grevillea robusta*, *Zizyphus* spp., *Ceratonia siliqua*, *Acacia arabica*, *Cajanus indicus*, etc.

The stages of this mealybug are described. Eggs are laid within an ovisac containing from 150–300 eggs, after completion of which the female dies. The young larvae appear after an incubation period of

from six to nine days. The feeding period covers about four weeks in summer, but there are considerable variations in the duration of the life-cycle. From early September onwards it begins to lengthen, and continues throughout the winter, though only the more hardy individuals survive and development is much retarded. Hibernation occurs in the egg-stage, ovisacs being found in numbers in crevices of the bark. Males never occur in any quantity, the maximum being reached in September, when the proportion is about 1 to every 500 females. Reproduction during the summer is parthenogenetic; the males appearing late in the year may give rise to a hardier generation to meet winter conditions.

Fumigation is effective against *P. hirsutus*, but a heavier dose is required than for the black scale of orange [*Saissetia oleae*], and it is almost impracticable owing to the variation in the nature and size of the trees attacked. Spraying with paraffin emulsion is effective when accompanied by pruning, but reinfestation, which almost invariably follows in Cairo, is then worse than before. Moreover, the young growing shoots become so gnarled in consequence of infestation that no spray can penetrate. The substitution of less susceptible varieties of trees is recommended. Legislation enacted during the past three years, prohibiting transport of infected plants and fruits and enforcing the cleaning of infested areas, has done much to prevent the spread of the pest.

DEBSKI (B.). **Descriptions d'une Cécidie et de l'Insecte qui la provoque : *Psectrosema alfierii*, nov. spec. (Cecidomyidae), comparées à celles du *Psectrosema debskii* (Kieffer 1912).**—*Bull. Soc. Ent. d'Egypte, Cairo*, xiv (1921), 1922, pp. 32–51.

A description is given of *Psectrosema alfierii*, sp. n., forming galls on *Tamarix* spp., and of the resulting deformation of the tree.

BEDFORD (H. W.). **The Asal of Cotton and its Causes in the Sudan.**—*Wellcome Trop. Res. Lab., Khartoum*, Ent. Sec., Bull. 17, November 1921, 8 pp., 2 figs. [Received 5th July 1922.]

The sticky substance sometimes found on cotton plants in the Sudan, where it is known as asal, may be due to an excessive secretion of sticky fluid by the plant itself or to the presence of insects that secrete a similar substance.

The secretion has a definitely injurious effect on the plant. The various sources of it are briefly described, the insects involved being *Aphis gossypii*, Glov. (cotton aphis), *Heliothrips indicus*, Bagn. (cotton thrips) and Aleurodids.

BEDFORD (H. W.). **The Cotton Thrips (*Heliothrips indicus*, Bagnall) in the Sudan.**—*Wellcome Trop. Res. Lab., Khartoum*, Ent. Sec., Bull. 18, November 1921, 52 pp., 5 plates. Price 2*s*. [Received 5th July 1922.]

The life-history and habits of *Heliothrips indicus*, Bagn., in the Gezira are described, most of the information having already been noticed [*R.A.E.*, A, viii, 497].

The natural enemies so far observed have not been seen in sufficiently large numbers to keep the thrips under control. A brief account is

given of the following predators: *Chrysopa* sp., *Chilomenes vicina*, Muls., *Syrphus aegyptius*, Wied., and a small bug, *Triphleps* sp.

In addition to the remedial measures previously noticed it is suggested that screen crops be grown along the northern, eastern and western edges of cotton fields, the plant suggested being *Cajanus indicus*. Hand-picking of badly infested leaves is also recommended, but only in conjunction with heavy waterings.

TOMPKINS DE GARNETT (R.). **Notes sur le *Dinapate wrighti*, Horn (Col. Bostrychidae).**—*Bull. Soc. Ent., France, Paris*, 1922, no. 9, pp. 119–121, 1 plate.

Dinapate wrighti, Horn [*R.A.E.*, A, x, 364] is recorded from *Washingtonia* (*Neowashingtonia*) *filifera* in California. Contrary to the statement by Hubbard (*Ent. News, Philadelphia*, x, 1899, p. 83), that oviposition never occurs on living trees, exit holes were found on trees of medium and large size. The trees had apparently not suffered in any way. In living trees the exit holes are almost always in the basal portion of the trunk, seldom at the summit; whereas in fallen trunks the beetles emerge from any portion. The larval galleries are always found at a depth of at least an inch from the bark, and the heart of a trunk with a diameter of over about seven inches is also left untouched. The development of the beetle covers a period of at least three years.

GARMAN (H.). **The Strawberry Crown-borer** (*Tyloderma fragariae*).—*Kentucky Agric. Expt. Sta., Lexington*, Circ. 27, October 1921, pp. 27–34, 2 figs. [Received 5th July 1922.]

Tyloderma fragariae (strawberry crown-borer) has become a serious pest in recent years owing to the increased acreage of strawberries in some parts of Kentucky, the chief danger lying in numerous small plantings for home use that are likely to be neglected. The beetles leave the plants in autumn and hibernate in the soil of the strawberry beds, becoming active again in the following season and ovipositing at the base of the leaf petioles or on the side of the crown in the soil. The newly hatched larvae begin at once to burrow into the crowns, their mines extending to the lower end. There is generally only one in each plant, and the greater part of the crown may be eaten away before the larvae reach maturity. Adults emerging from the plants in late summer feed on the leaves as long as the warm weather lasts.

Plants started early, before the beetles become active, are less severely damaged than later ones. No plant other than the strawberry is known to be attacked; the weeds likely to harbour the pest are Rosaceae, those most likely to furnish alternative food being enumerated.

New beds should be started at least 150 yards from old ones, and only young plants formed from runners during the preceding summer should be used, taking them from the old beds between 15th November and 1st April, when the insect will not be present in the plants. As soon as old beds cease to be profitable they should be ploughed up and raked off and burnt in July or August, when the insects are most numerous in the crowns. Beds that are only slightly infested and still

produce a profitable crop might be sprayed with 1½ lb. lead arsenate powder in 40 U.S. gals. of water as a means of keeping the borer under until the plants can be ploughed up and destroyed.

GARMAN (H.). **Flea Beetles of Tobacco and Potato.**—*Kentucky Univ. Coll. Agric., Extens. Div., Lexington,* Circ. 109, July 1921, 4 pp., 2 figs. [Received 5th July 1922.]

Epitrix parvula is very destructive to young tobacco plants in the beds and for some time after they have been transplanted to the fields. The eggs are laid in the soil among weeds, and the larvae feed on the roots of the plants. The adults gnaw small areas in the leaves, producing a diseased appearance sometimes mistaken for rust. The whole life-cycle is completed in about 30 days, and several broods may develop in a season.

The flea-beetle attacking potatoes in Kentucky is *E. fuscula*; the plants are often so badly gnawed that growth is checked and the yield reduced. This species also occurs on egg-plants.

Both species may be destroyed by poisons applied to the leaves, but treatment should be made early, before the beetles are noticed. Powdered lead arsenate, 1½ lb. to 40 U.S. gals. water, may be applied with a watering can or sprayer. Two applications are generally sufficient for tobacco. Paris green may be used at the rate of ¼ lb. in 40 U.S. gals. water with the addition of 1 lb. freshly slaked lime. In the case of potatoes the lead arsenate spray with the addition of Bordeaux mixture produces a decided increase in the yield by preventing injury from flea-beetles and potato-beetles, as well as affording a certain amount of protection from early blight. Spraying should be begun when the plants are young, and repeated every ten days.

WADE (J. S.). U.S. Bur. Ent. **Observations on *Typocerus sinuatus*, Newman, as a Forage Plant Pest.**—*Bull. Brooklyn Ent. Soc., Brooklyn,* xvii, no. 1, February 1922, pp. 27–29, 1 plate. [Received 5th July 1922.]

The Cerambycid, *Typocerus sinuatus*, Newm., hitherto only considered of economic importance as a pest of forest trees, has been found to cause injury to the forage plant, *Andropogon scoparius*, in the Central Great Plains region. The insects eat out the crown of the plant, causing the stems to break off just below the surface of the ground, and the base of the plant may be entirely eaten. In the late spring the older stems of plants are attacked in preference to green ones. In Kansas considerable areas are damaged. This pest also feeds on roots of bunch grass (*Sporobolis airoides*), Indian grass (*Sorghastrum nutans*) and Colorado blue stem (*Agropyron smithi*).

In Kansas the larvae hibernate in cells beneath the infested plants, becoming active again in early spring. Pupation occurs about the end of April in earthen cells, the adults emerging early in June. Eggs are probably deposited shortly afterwards. The length of the larval stage apparently varies with the quantity and quality of the food supply. In clumps of grass that have been burnt over the larval stage is greatly retarded, and under such conditions the life-cycle from egg to adult may cover two seasons. The adults are not found after July.

GARMAN (H.). **The Effect of Paradichlorobenzene on the Viability of Stored Seeds.**—*Seed World, Chicago, Ill.*, 17th February 1922, p. 19. [Received 5th July 1922.]

Paradichlorobenzene has proved of great value in Kentucky both in preventing insect attack and in destroying existing pests. This fumigation does not affect seed intended for sowing, but the effect on the odour and taste of seed intended for food still remains to be determined. The deterioration, if any, as a result of fumigation is very slow and very slight. In some of the tests the fumigant was used at the rate of 4·69 ounces to the cubic foot, which is more than is needed to keep the seed free from pests.

Insect Pests and Plant Diseases.—*Repl. Agric. Dept., Grenada, 1921, Barbados*, 1922, pp. 4–5.

The insect pests recorded during 1921 are: *Heliothrips rubrocinctus*, Giard (cacao thrips); *Cremastogaster brevispinosa*, Mayr, var. *minutior*, For. (acrobat ant) in association with *Pseudococcus* sp., against which spraying experiments are being made; an undescribed species of *Cholus* [*C. wattsi*, Mshl.] causing serious damage to pineapples, though absent where clean cultivation is practised; *Tomaspis saccharina*, Dist., apparently controlled in some fields as a result of efficient cultural methods and parasitic fungi; *Diatraea saccharalis*, F. (sugar-cane moth borer), greatly in evidence in neglected ratoon canes; *Rhynchophorus palmarum*, L. (palm weevil), generally distributed and probably transmitting Nematodes from dead coconut palms to healthy trees; the cotton-stainer, *Dysdercus delauneyi*, Leth., found wherever cotton is grown or Malvaceous food-plants are present; *Calotermes balloui*, which is found on cacao plantations in different parts of the island and may be controlled by proper tree surgery; *Aspidiotus destructor*, Sign. (Bourbon scale), less serious on coconuts than in 1920; and *Araecerus fasciculatus*, DeG. [*R.A.E.*, A, x, 276].

Cotton.—*Repl. Agric. Dept., Tortola (Virgin Islands), 1920–21, Barbados*, 1922, p. 6.

Cotton pests in general were not very severe during 1920–21. *Alabama argillacea* (cotton worm) was most troublesome in December and January, and *Dysdercus andreae* (cotton stainer) and *Eriophyes gossypii* (leaf blister mite) appeared in isolated numbers during the dry months of February and March. The pink bollworm [*Platyedra gossypiella*] was discovered in various localities during June and July, but owing to its late appearance it apparently caused no appreciable damage to the cotton industry. Voluntary campaigns have been undertaken, in order to prevent the establishment of this pest; they consist mainly in the burning and cleaning up of old cotton trees and the abandonment of cotton-growing for one year. Legislation was applied for at the end of the season so that future campaigns might be carried out by the Experiment Station.

Introduction of Pink Bollworm.—*Repl. Agric. Dept., Montserrat, 1920–21, Barbados*, 1922, pp. 10–11.

The discovery of *Platyedra* (*Gelechia*) *gossypiella* (pink bollworm) in Montserrat is reported upon, and the recommendations made for control of this moth and the methods of carrying them out are quoted [*R.A.E.*, A, ix, 99, 324, 400, 481].

Bogdanov-Katkov (N. N.). **Отчет о Деятельности Петроградской Станции Защиты Растений от Вредителей за 1919 год. Предположения на 1920 год.** [Report of Petrograd Station for the Protection of Plants from Pests for 1919. Plans for 1920.] —**Известия Петроградской Областной Станции Защиты Растений от Вредителей** [*Bull. Petrograd Div. Sta. for Protect. Plants from Pests*], *Petrograd*, ii, November 1921, pp. v–liii, 5 figs. [Received 7th July 1922.]

In the course of this report a brief outline is given of the control measures undertaken during 1919.

The pests dealt with included: The cabbage fly [*Phorbia brassicae*, Bch.]; *Phaedon cochleariae*, F.; the cabbage aphis [*Brevicoryne brassicae*, L.]; *Barathra brassicae*, L.; *Euxoa* (*Agrotis*) *nigricans*, L.; the cabbage moth [*Plutella maculipennis*, Curt.]; and the onion fly [*Hylemyia antiqua*, Meig.].

Cholodkovsky (N. A.). **О новом виде рода** *Pemphigus*, **Hartig, живущем на ольхе.** [On a new species of the Genus *Pemphigus*, Hrtg., living on Alder.]—**Известия Петроградской Областной Станции Защиты Растений от Вредителей** [*Bull. Petrograd Div. Sta. for Protect. Plants from Pests*], *Petrograd*, ii, November 1921, pp. 5–9, 4 figs. [Received 7th July 1922.]

Pemphigus baicalensis, sp. n., is described from individuals taken in 1914 on *Alnus viridis* in the Transbaikal region. Little is known of its life-history, but it apparently lives on alder and there is no evidence of an alternative food-plant.

The author considers that *Prociphilus* (*Eriosoma*) *tessellatus*, Fitch, described by Pergande as living on the bark and roots of alder, should be transferred to the genus *Pemphigus*.

Jakobson (G. G.). **К Морфологии и Систематике некоторых родов подсем. Chrysomelini.** [On the Morphology and Classification of some of the Genera of the Subfamily Chrysomelini.]—**Известия Петроградской Областной Станции Зашиты Растений от Вредителей** [*Bull. Petrograd Div. Sta. for Protect. Plants from Pests*], *Petrograd*, ii, November 1921, pp. 20–24. [Received 7th July 1922.]

Phaedon bogdanovi-katkovi, sp. n., from the Ural district, is described in Latin.

Schtakelberg (A. A.). **Фенологические Наблюдения над Насекомыми в Петрограде и его Окрестностях в 1918 году.** [Phenological observations on Insects in Petrograd and its neighbourhood in 1918.]—**Известия Петроградской Областной Станции Защиты Растений от Вредителей** [*Bull. Petrograd Div. Sta. for Protect. Plants from Pests*], *Petrograd*, ii, November 1921, pp. 25–53. [Received 7th July 1922.]

Data regarding the occurrence of insects in the district of Petrograd are recorded in the form of a diary as an aid for future studies of insect pests.

JAKOBSON (G. G.) & others. **Практическая Энтомология. Руководство к практическим Занятиям по Энтомологии (Курс высших учебных Заведений).** [Practical Entomology. Handbook of Practical Studies in Entomology (Course for advanced Educational Institutions).]—**Государственное Издательство** [*Government Publication*], *Petrograd*, pt. 9, sect. 1, 1921, 107 pp., 49 figs. [Received 7th July 1922.]

Contrary to the original plan [*R.A.E.*, A, ix, 479], it has been found necessary to devote two parts of this handbook to the description of summer measures against insect pests, each part being again subdivided into two sections.

The present section contains information and instructions for the collection and preservation of insects.

The second section will deal with the bionomics of insects, their economic importance and the interrelation between them and other animals.

BOGDANOV-KATKOV (N. N.). **Капустная Белянка и меры Борьбы с ней.** [Cabbage Butterfly and its Control.]—**Всероссийский Союз С. Х. Кооперации (Сельскосоюз)** [*All-Russian Union of Agric. Co-op.*], *Moscow & Petrograd*, 1922, 20 pp., 13 figs., 1 plate. [Received 7th July 1922.]

A detailed account is given of the life-history and habits of *Pieris brassicae*, L. [*cf. R.A.E.*, A, ix, 552], with particulars of the better known remedial measures and a list of the twenty-six parasites of this butterfly that have been recorded by various authors.

LOTRIONTE (G.). **Means of preventing the Officinal Cantharides, *Lytta vesicatoria*, from injuring Fruit Trees.**—*La Nuova Agricoltura di Lazio, Rome*, ix, no. 204, 10th July 1921, p. 77. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 9, September 1921, pp. 1211–1212.) [Received 7th July 1922.]

In some parts of central and south Italy *Lytta vesicatoria*, L., often causes perceptible injury to olive and other fruit trees by rapidly devouring the leaves and tender shoots. The only measure hitherto employed against this beetle has been jarring the trees in the early morning.

By the advice of the author this treatment has been superseded for some years past, especially in the case of olive trees, by applying a spray with an acid Bordeaux base (3 lb. copper sulphate and 2 lb. slaked lime in 20 gals. water) to which has been added 2–3 lb. lead arsenate. A single application made at the beginning of an infestation has always sufficed to free the trees completely in a few hours. The slight traces of lead arsenate disappear by the time the olives are gathered.

FURTADO (C. X.). ***Oryctes rhinoceros*, a Coleopteron injurious to the Coconut Palm in Goa, Portuguese India.**—*Bol. Agric., Nova Goa*, ii, no. 1–4, 1920, pp. 82–85. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 9, September 1921, pp. 1212–1213.) [Received 7th July 1922.]

Oryctes rhinoceros, L., is an important enemy in Goa of the coconut palm, which is one of the principal sources of revenue there. The damage it does is usually confused with that due to *Rhynchophorus*

ferrugineus, Oliv., which effects an entrance by means of the galleries excavated by *O. rhinoceros*. Dead palms must be removed and split open lengthwise, the fibrous portion being burnt. A vessel containing water in which a few small fish and other refuse had been placed to decompose for manurial purposes proved extremely attractive to the beetles. Common salt mixed with the rubbish will repel beetles, and all organic matter intended for use as manure should be treated with it, as it not only repels the beetles, but acts as a fertiliser to the coconut palm. If mechanical sprayers are available, the terminal bud of the palm can be sprayed with salt water. The larvae can be extracted with a wire hook and the hole closed with clay after a little turpentine or tar has been poured in.

WOLCOTT (G. N.). **Animal Pests of the Cacao Tree in the Dominican Republic.**—*Rev. Agric. Puerto Rico, San Juan*, vi, no. 6, 30th June 1921, pp. 11–12. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 10. October 1921, pp. 1357–1358.) [Received 10th July 1922.]

When grown on virgin soil, cacao trees in the Republic of Dominica are usually attacked by the larvae of a beetle, *Strategus titanus*, F., which feed upon the roots; these pests can be got rid of by carefully and thoroughly cleaning the ground.

An Aphid, *Toxoptera aurantii*, Boy., and a Coccid, *Pseudococcus citri*, Risso, are more dangerous enemies. The former infests the youngest leaves, the floral buds and the peduncles of the fruits while they are small, and the latter occurs on the peduncles of the flowers and fruits, and even the fruits themselves, with the result that the buds and flowers wither and fall. These pests are protected by an ant, *Solenopsis geminata*, F., and if the latter can be destroyed or prevented by banding from ascending the tree, the Aphids and Coccids soon decrease. As long as cacao trees are allowed to grow close together and are left unpruned, it is useless to spray against these pests.

FLETCHER (T. B.) & INGLIS (C. M.). **Some Common Indian Birds. No. 14. The Indian Hoopoe** (*Upupa epops indica*).—*Agric. Jl. India, Calcutta*, xvii, pt. 2, March 1922, pp. 113–118, 1 pl., 1 fig.

The Indian hoopoe (*Upupa epops indica*) deserves every encouragement and protection, as it is an active destroyer of many noxious insects. It feeds chiefly on larvae that it digs out of the ground, including cutworms; Melolonthids, *Anomala* sp., and crickets have also been noticed among its food. These birds are protected throughout the year in the greater part of India

FELT (E. P.). **The European Corn Borer.**—*Cornell Univ. Agric. Coll., Ithaca, N.Y.*, Extens. Bull. 31, February 1919, revised March 1922, pp. 35–48, 2 plates, 5 figs. [Received 7th July 1922.]

This account of the now well-known pest, *Pyrausta nubilalis*, Hb., is based largely on special investigations authorised by the New York State Legislature of 1920, and to some extent on the studies of the author as collaborator in the European corn-borer work of the Federal Bureau of Entomology. The infested territory in eastern New York covers over 3,078 square miles; a list of the localities is given.

Although the parasite, *Trichogramma minutum*, was extremely abundant during 1919 in eastern Massachusetts, subsequent observations show that its occurrence is too erratic for it to be relied upon as a permanent check on the borer. Parasites are now being introduced from France, and it is hoped that they will prove of considerable service, though the results may not be apparent immediately.

The preventive and remedial measures recommended have already been noticed [*R.A.E.*, A, x, 211].

WEISS (H. B.). **Notes on the Puffball Beetle,** *Caenocara oculata*, **Say.**—*Psyche, Boston, Mass*, xxix, no. 3, June 1922, pp. 92–94.

The Anobiid, *Caenocara oculata*, Say, has been observed in New Jersey breeding in the puffball, *Scleroderma vulgare*. On 5th September several adults were found projecting from small circular holes in the walls of the fungus, and in it numerous full-grown larvae were found, some of which had constructed oval cells in the spore mass. The larvae undoubtedly feed chiefly when the fungus is young and the interior is solid and fleshy. The larva, pupa and adult are described.

CHAMPLAIN (A. B.). **Records of Hymenopterous Parasites in Pennsylvania.**—*Psyche, Boston, Mass.*, xxix, no. 3, June 1922, pp. 95–100.

The Hymenopterous parasites recorded from Pennsylvania include:—

Evaniids: *Hemistephanus* sp., parasitic on *Dicerca divaricata* in *Betula lenta* and on unknown borers in *Quercus* spp.; *Oleisoprister abboti*, Westw., reared from *Liriodendron tulipifera* infested by *Leptura mutabilis*; *Odontaulacus bilobatus*, Prov., taken from dying hemlock (*Tsuga canadensis*) heavily infested with *Melanophila fulvoguttata*; *O. rugitarsis*, Cress., taken on cut white pine (*Pinus strobus*) infested with Scolytids and Cerambycids; and *Pammegischia burquei*, Prov., parasitic on *Xiphidria champlaini* in dead branches of *Carpinus caroliniana*, *X. attenuata* in dead branches of *Tilia americana*, and *X. maculata* in dead *Acer rubrum*, the adult parasites flying during May.

Braconids: *Macrocentrus delicatus*, Cress., reared from pupae of *Mineola indiginella*; *Helconidea ligator*, Say, reared from oak (*Quercus bicolor*) infested by *Purpuricenus axillaris*, from dead *Morus* sp. infested by borers, and from dead *Robinia pseudacacia*, infested by *Neoclytus erythrocephalus*; *H. borealis*, Cress., parasitic on Cerambycid larvae in dead *Rhus toxicodendron* and in branches of dead mulberry (*Morus rubra*); and *Helcon pedalis*, Cress., parasitic on *Xylotrechus* sp. in dead hemlock.

Ichneumonids: *Nemeritis canescens*, Grav., parasitic on the Mediterranean flour moth [*Ephestia kühniella*] in flour mills; *Xorides calidus*, Prov., parasitic on *Phloeotrya quadrimaculata* in dead sumac (*Rhus typhina*); *Odontomerus canadensis*, Prov., parasitic on Cerambycids in sumac (*Rhus* sp.); *Glypta simplicipes*, Cress., reared from larva of a leaf-tyer on *Azalea* sp.; *Scambus indigator*, Walsh, reared from pupa of *Mineola indiginella*; *Ephialtes aequalis*, Prov., reared from pupae of the codling moth [*Cydia pomonella*]; *Ichneumon irritator*, F., reared from *Cyllene pictus* and from *Chrysobothris* sp. in sapwood of dead *Cercis canadensis*; *I. comstocki*, Cress., reared from *Rhyacionia* (*Evetria*) *comstockiana*; *Rhyssa lineolata*, Kirby, taken ovipositing in

dead hemlock infested by *Urocerus albicornis*, adults of which were flying on 1st August, while pupae and mature, small and very young larvae were all found in hemlock stumps; *R. humida*, Say, from *Xiphidria champlaini* in dead *Carpinus caroliniana*; *Itamoplex vinctus*, Say, from cocoons of the peach-tree borer, *Aegeria* (*Synanthedon*) *exitiosa*; and *Lagarotis diprioni*, Roh., from cocoons of *Diprion lecontei*.

Ibaliids: *Ibalia ensiger*, Nort., ovipositing in hemlock and taken from cells of *Urocerus albicornis* in hemlock stumps; and *I. maculipennis*, Hald., parasitic on *Tremex columba* in hickory.

SNYDER (T. E.). U.S. Bur. Ent. **New Termites from Hawaii, Central and South America, and the Antilles.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lxi, Art. 20, no. 2441, 1922, pp. 1–32, 5 plates, 6 figs.

This paper describes 15 new termites and a new variety, some of which are of particular interest from the standpoint of comparative morphology and of phylogeny, viz., *Calotermes immigrans*, *C. montanus*, *C. tuberculifrons*, *C. cubanus*, *Neotermes connexus*, *N. connexus* var. *major*, *Cryptotermes rospigliosi*, *C. piceatus*, *C. thompsonae*, *Coptotermes niger*, *C. crassus*, *Armitermes intermedius*, *Constrictotermes* (*Tenuirostritermes*) *incisus*, *C.* (*T.*) *briciae*, *Anoplotermes gracilis*, and *A. manni*.

HORSFALL (J. L.) & FENTON (F. A.). **Onion Thrips in Iowa.**—*Iowa Agric. Expt. Sta., Ames*, Bull. 205, March 1922, pp. 54–68, 10 figs. [Received 10th July 1922.]

Since the severe infestation by *Thrips tabaci*, Lind., in 1894, there have been more or less definite outbreaks at frequent intervals in Iowa, the last two being in 1917 and 1919 when the average yield of 400 bushels per acre was reduced to 200 and many fields showed a total loss. The life-history of this thrips and the character of the injury caused are described. Experiments show a range of from seven days in July to sixteen in September, with an average of eleven days, for the life-cycle from the hatching of the egg to the emergence of the adult. The average incubation period is three days.

The periodicity of epidemics is in direct relation to the temperature and rainfall during June, July and August. No parasites have been found in Iowa. A temperature above normal and rainfall below normal are factors that favour the development of the thrips and are unfavourable for the proper growth of the onion plant.

Preventive measures are at present the most effective and economical ones, and should aim at eliminating the sources of spring infestation [*R.A.E.*, A, x, 191]. In normal seasons a certain check on the development of the thrips is exercised by the predacious insects, *Triphleps insidiosus*, larvae of *Chrysopa* and *Syrphus*, *Hippodamia convergens* and *Coccinella novemnotata*.

HOLLOWAY (T. E.). U.S. Bur. Ent. **The Control of the Sugar Cane Borer.**—Separate from *Facts about Sugar, New York*, xiv, no. 23, 3rd June 1922, 1 p.

Many theories have been advanced in explanation of the appearance of sugar-cane borers [*Diatraea saccharalis crambidoides*] in the fields in the spring. The author suggests that they probably emerge from the seed cane, planted in October, in which many of the larvae pass the winter. The moths can emerge through at least half an inch of

packed soil. After emergence they oviposit on the young plants. A general average of 10,000 stalks examined showed greater infestation in the plant cane than in the stubble. Owing to the difficulty in obtaining seed cane free from borers, experiments are being conducted at Audubon Park, Louisiana, with a view to killing the borers in the cane; in this connection paradichlorobenzene has so far given promising results. Another suggestion is that an area of about a mile square be devoted to stubble cane and maize for a year. As the borers attacking maize originate in the seed cane, the elimination of the latter should tend to reduce the infestation. So far there has been no opportunity of testing this method.

ZACHER (F.). **Südamerikanische Kakaoschädlinge.** [South American Cacao Pests.]—*Der Tropenpflanzer, Berlin*, xxv, no. 6, July–August 1922, pp. 119–121.

This brief review of the various insect pests of cacao in South America is compiled from published sources.

RANKIN (W. H.) & HOCKEY (J. F.). **Mosaic and Leaf Curl of the Cultivated Red Raspberry.**—*Canada Dept. Agric., Domin. Exptl. Farms, Div. Bot., Ottawa*, Circ. N.S. no. 1, March 1922, 3 pp. [Received 10th July 1922.]

The nature and symptoms of these diseases are described and the susceptibility of different varieties of raspberries is discussed. Both mosaic and leaf-curl are transmitted by *Aphis rubiphila*, which spends its whole life on the raspberry plant. Eggs are laid in the axils of the buds on the suckers, and Aphids that hatch and feed on diseased canes in the spring crawl to adjoining bushes with new green suckers in search of better food, carrying with them the infection.

Great care should be taken to plant only disease-free stock; infestation from neighbouring ground is not likely to occur, as the Aphids do not apparently develop a winged state in the field and will not therefore travel any distance. Diseased plants should be removed at the time of year when the Aphids are not active. All plants affected by leaf-curl should be dug up and carried to a distance from the plantation as soon as the symptoms are distinguishable in the spring. As this must be done before the Aphid eggs hatch, within a week or so of 1st May is usually the best time. For mosaic disease the best time for removal has not been definitely determined, but will probably be the period immediately following the first two weeks of steady hot weather in the summer. The diseased plants must be lifted away and not dragged, as this would merely scatter the Aphids about the plantation. The eradication of mosaic bushes must be finished before the cooler weather of late summer, when the Aphids again become active and more numerous. The selection or breeding of immune varieties is a problem for the future.

DOWNES (W.). **The Strawberry Root Weevil, with Notes on other Insects affecting Strawberries.**—*Canada Dept. Agric., Ent. Branch, Ottawa*, Pamphlet N.S. no. 5, January 1922, 16 pp., 5 figs. [Received 11th July 1922.]

A detailed account is given of the life-history and control of *Otiorrhynchus ovatus*, L. The latter consists mainly of cultural methods, including ploughing of infested fields at the proper time of year and

crop rotation, and the use of weevil-proof barriers [*R.A.E.*, A, ix, 130]. The habits of *O. sulcatus*, F. (black vine weevil) and *O. rugifrons*, Gyll., are similar to the above, and the same remedial measures may be applied.

Notes are also given on the life-histories of, and remedial measures for, *Aristotelia fragariae*, Busck (strawberry crown-miner), *Polyphylla decemlineata*, Say (western ten-lined June beetle) and *Aegeria* (*Synanthedon*) *rutilans*, Hy. Edw. (strawberry crown moth).

VERMOREL (V.). **Les Bouillies mouillantes et adhérentes.**—*Progrès Agric. et Vitic., Montpellier*, lxxviii, no. 28, 9th July 1922, p. 37.

The wetting and adhesive properties of alkaline Bordeaux mixtures may be increased by the addition of $\frac{1}{5}$–$\frac{1}{2}$ lb. of casein to every 100 gals. of mixture, or skimmed milk at the rate of one part to 100.

Acid and copper mixtures may be improved by the addition of gelatine or glue, a liquid form of the latter being the most suitable substance. To prepare it 10 lb. of glue (cake) is soaked in cold water, and then dissolved in 1 gal. of boiling water over a slow fire ; 5 lb. of zinc chloride, which will prevent the glue from solidifying when cold, is then added. These proportions are sufficient for 100 gals. of mixture. Gelatine should be used at the rate of $\frac{2}{5}$–$\frac{1}{2}$ lb. to 100 gals.

Summary of the Programme of the Swedish State Institute of Experimental Forestry for the Period 1922-26.—*Medd. Stat. Skogsförsöksanst., Stockholm*, xix, no. 1, 1922, pp. 75–78. [Also in Swedish and German.]

The new investigations planned for the entomological section are the preparation of reliable methods of collecting the insects living in the ground, and the investigation of the fauna in certain types of forest with a comparison between clearings and undisturbed stands.

Work on injuries to forest trees by insects is being continued, especially : Investigations on pine beetles [*Myelophilus* spp.] in general, with studies on the influence of bark removal on their occurrence in wood cut in winter ; observations on the effect of injuries in the crowns on the growth of affected trees ; studies of the distribution, biology and importance of bark-beetles in different parts of Sweden ; studies of the development of the spruce bark-beetle [*Ips typographus*] ; experiments with different methods of preparing trap-trees, and the effect of variations in the time of cutting them ; investigations on insects injurious to spruce and pine cones, with special attention to the cone fauna in summer, and experiments in killing the larvae of the spruce cone moth [*Dioryctria abietella*] by hydrocyanic acid ; and studies of the insects occurring after forest fires, with a view to ascertaining the danger of burnt forests being centres of infestation and the possibility of treating the slightly damaged trees so that the deterioration due to borers may be prevented.

JACK (R. W.). **Notes from the Entomological Branch.**—*Rhodesia Dept. Agric., Salisbury*, Bull. 425, June 1922, 8 pp., 4 plates.

Very little is known about the life-history of *Apophyllia murina*, Gerst., a leaf-eating beetle that infests maize. The larvae feed on the underground stems, thereby reducing the value of the cobs.

Larvae collected in January produced adults 19 days later. There is probably more than one brood a year. Adults have been bred in

January, February, March and April, and they will feed on the leaves of maize and some other grasses, though these may not be the favourite food-plants. The larvae are injurious in December and January, when the maize plants are young enough to suffer from their attack. The eggs are not necessarily laid on the crop itself. The larvae will feed on the underground stems of *Eleusine indica* and probably other grasses; they have also been reported as attacking the pods of ground-nuts and the underground stems of tobacco. In many cases infestation can be traced to land covered with *E. indica* the previous season. All attacks noticed by the author occurred on red or yellow soils, but this beetle may prove a pest of heavier lands also.

A pink grub is recorded as feeding on the underground stems of kaffir corn, destroying the heart, so that the entire plant withers. According to Dr. Peringuey, it is probably a Melyrid and belongs to a new genus. The beetles are found in abundance on Natal red-topped grass (*Tricholaena rosea*) and teff grass in April and May, and have also been reported from peas, beans, cowpeas, etc. It is not known whether these plants are normally injured, but in one instance a grub was found entirely buried in the stem of an unhealthy cowpea plant, which was also infested with *Agromyza* sp. (bean stem maggot). In captivity the eggs are laid loosely in the soil, in which also the larva constructs a chamber for pupation. Eggs are laid freely in April and May and hatch in May and June, from which fact it is supposed that the winter is passed in the larval stage in the soil. There is a possibility that the grubs are partly predacious. There is probably only one brood during the year.

Departmental Activities: Entomology.—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 6, June 1922, pp. 495–500.

A small flea-beetle, resembling in general appearance the American species, *Phyllotreta vittata*, has recently been very destructive to cabbages, gnawing into the stems and completely defoliating some plants. Radish, turnip, rape, and other crucifers are also severely damaged. Within the last few months, the presence of a highly destructive sweet potato weevil, a species of *Cylas*, has been discovered in Nyasaland, and is already recorded from Uganda and Zanzibar. The difficulty of guarding against this pest in consignments of sweet potatoes from other countries is pointed out, for one tuber has been found to contain as many as 109 adult weevils, 34 pupae and 5 larvae.

A warning is given to prospective purchasers of apple trees, that if they wish to buy trees of varieties susceptible to woolly Aphis [*Eriosoma lanigerum*, Hausm.] on roots that are certain to remain immune from attacks of that pest, they should demand trees on blight-proof stocks, and not simply trees on blight-proof roots.

Epimadiza nigra, Lamb (gladiolus fly) is very troublesome in Durban, all stages of the plant being attacked; in early attacks no flower-stalk is produced; in late infestations the flower-buds fail to open, and the maggots apparently migrate to the main stalk, which ultimately breaks down. Several reports of damage to garden plants by the ant, *Dorylus helvolus*, L., are recorded. The cabbage Aphis [*Brevicoryne brassicae*, L.] causes much unnecessary damage each year. After the crop is harvested every cabbage stump or useless plant should be collected and destroyed, as well as any cruciferous or other weed likely to harbour the pest. When fields are infested the plants attacked should be pulled up and the remainder sprayed with tobacco extract

(6 to 8 per cent. nicotine), one part to 80 parts of water with one lb. soap to 20 gals. of the mixture. Several applications may be necessary.

A case is recorded of reeds, of an undetermined species, used as dry thatch for a tobacco drying shed, being heavily infested with caterpillars of the Noctuid, *Nodaria extinctalis*, Zell. The bug, *Bagrada hilaris*, Burm., was very destructive to cruciferous crops in the Bloemfontein district. An undetermined Buprestid borer has been recorded attacking *Eucalyptus resinifera* in Zululand.

Gunn (D.). **The Woolly Bear Caterpillar** (*Teracotona submacula*, **Walker**).—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 6, June 1922, pp. 542–547, 5 figs.

The Arctiid, *Teracotona submacula*, Wlk., is distributed throughout the Union of South Africa and feeds upon a large number of wild and cultivated plants, the preferred ones being cabbage, bean, beet and lettuce. There are two generations in a year, adults appearing at the end of February and in mid-May. The female moth deposits 350–500 eggs in clusters on leaves, stems and twigs, and the larvae feed on the leaves until the plants become defoliated. The larval stage occupies from 45–52 days, and this period may be prolonged by cold weather. When mature, the caterpillar constructs a cocoon a little below the ground surface. The pupal stage lasts 112–120 days or more, the whole life-cycle requiring 175–185 days. Natural enemies include a Chalcid parasite of the eggs, a Braconid parasitic on the caterpillars, and two Tachinids that emerged from the pupae. The Cape robin, *Cossypha caffra*, feeds upon the caterpillars.

In small areas, hand collection of the caterpillars is advised; in large areas, 1 lb. Paris green with 2 lb. lime in 100 gals. water should be sprayed on the plants, or 1½ lb. lead arsenate powder in 50 gals. water; these sprays can safely be used on the plants before the heads are formed.

Juritz (C. F.). **The Nicotine Content of South African Tobacco.**—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 6, June 1922, pp. 552–562.

A series of tables records the nicotine content of different varieties of South African tobaccos. As a rule, the heavier kinds yield 3–5 per cent. of nicotine, the lighter leaves from 1 or less to 2 per cent., and the common wild tobacco (*Nicotiana glauca*) considerably less than 1 per cent. The most promising yield was from *N. rustica*, which gave 6–8 per cent. or more.

Schindler (A.). **Organisation de la Lutte contre l'***Icerya purchasi* **au Maroc en 1921.**—*Rev. Hortic., Algiers*, xxvi, no. 5, May 1922, p. 89.

The successful introduction of *Novius cardinalis* into Morocco against *Icerya purchasi* has already been noticed [*R.A.E.*, A, x, 318].

d'Angremond (A.). **Jaarverslag 1 Mei 1920–30 April 1921.** [Annual Report of the Vorstenland Tobacco Experiment Station from 1st May 1920 to 30th April 1921.]—*Meded. Proefst. Vorst. Tabak. Klaten, Java*, xliv, 1921, pp. 3–14. [Received 11th July 1922.]

During the year under review insect pests were not present to an abnormal extent. On some estates, tobacco in the drying sheds was

badly damaged by caterpillars, many of which must have been brought in from the fields. Tobacco plants in the sheds may become breeding-places for the tobacco aphis [*Myzus persicae*] and *Phthorimaea heliopa*. Baled leaf suffered little from *Lasioderma* [*serricorne*].

MASON (A. C.). U.S. Bur. Ent. *Cryptothrips laureli*, **a New Thrips from Florida (Thysanop.).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 7, July 1922, pp. 193–199, 1 plate.

The thrips living on all species of native bay trees (*Tamala*), and previously thought to be identical with *Cryptothrips floridensis* [*R.A.E.*, A, viii, 134], has now proved to be a distinct species, *C. laureli*, sp. n. Although it is only known to occur in Florida, it probably extends over the entire range of its food-plant. It will also feed on camphor (*Camphora camphora*), but it is doubtful whether it would become permanently established on it. The average life-cycle from egg to adult for 50 individuals occupied 28·3 days, the incubation period being 6·5 days and the average time for larval and pupal stages together 21·8 days. In confinement the life of the adult often lasted about 60 days. All stages are found around the terminal buds of the bay, the larvae feed on the newly unfolding leaves; the adults also attack the new growth. As a rule, no damage is done, but in a heavy infestation the buds may be killed. The leaves generally outgrow the injury. This thrips is also able to puncture the human skin.

An undescribed species of *Tetrastichus* lays its eggs in the body of the larva of *C. laureli* and causes its death. An Anthocorid bug, *Anthocoris* sp., is predacious on the larvae.

SPESSIVTSEFF (P.). **Zur Lebensweise des** *Chaetoptelius vestitus*, **Rey.** [A Contribution to the Knowledge of the Habits of *C. vestitus*.]—*Entom. Blätter, Berlin*, xviii, no. 2, 30th June 1922, pp. 75–77.

Chaetoptelius vestitus, Rey, is very common on the southern bank of the Crimean Peninsula, where it breeds in the mastic tree, *Pistacea mutica*. This bark-beetle and a small species, *Estonoborus perrisi*, Chap., which nearly always occurs with it on mastic, both occasionally attack pines.

GOUIN (R.). **Les Vers à Soie et les Hannetons comme Aliment du Bétail.**—*La Vie Agric. et Rur., Paris*, xxi, no. 27, 8th July 1922, pp. 27–28.

Professor Pirocchi, of Milan, has found that suitably treated cocoon waste from silk spinning mills can be substituted for linseed cake for milch cows, two parts of it replacing three of linseed cake.

As cockchafers [*Melolontha*] are expected to be extraordinarily abundant in France in 1922, attention is drawn to their richness in nitrogen and to the possibility of extracting oil from them. The larvae are eaten by poultry and pigs.

GRAM (E.) & ROSTRUP (S.). **Oversigt over Sygdomme hos Landbrugets og Havebrugets Kulturplanter i 1921.** [Plant Diseases and Pests in Denmark in 1921.]—*Tidsskrift f. Planteavl., Copenhagen*, xxviii, 1922, pp. 185–246. [With a Summary in English.]

During the year under review the yield from beet seed fields was greatly decreased by the black aphis, *Aphis rumicis* (*papaveris*). The leaves, particularly in early-sown fields, were wilted by the beet

leaf-miner, *Pegomyia hyoscyami*; in one case it seemed as if the pupae were spread with manure containing beet leaves. *Meligethes aeneus*, caused severe losses in turnip seed fields where catching machines were not used; early cutting to retard the flowering proved of doubtful value. Cabbage top in swedes was proved, as in England, to be caused by *Contarinia nasturtii*. A Nematode, *Tylenchus hordei*, was abundant on roots of *Poa pratensis*, and *Heterodera radicicola* was recorded on cucumbers. Against the winter moths, *Cheimatobia brumata* and *C. boreata*, a proprietary adhesive, "Falster," proved valuable and economical, remaining sticky all the winter. The larvae have been observed eating the flowers and fruits of black currants. Cutworms, *Euxoa* (*Agrotis*) *segetum*, were very harmful to leeks and in mangel and sugar-beet fields. Wireworms, *Agriotes lineatus*, infested oats and barley.

LEES (A. H.). **The Association of Black Currant Mite** (*Eriophyes ribis*) **with Reversion Disease.**—*Ann. Rept. Agric. & Hortic. Res. Sta. Long Ashton, Bristol*, 1921, pp. 58–61. [Received 17th July 1922.]

The following are the author's conclusions as a result of the observations described in this paper: Normal bushes are generally free from "Big Bud" infection (due to *Eriophyes ribis*), but may be slightly attacked; reverted bushes are usually attacked, but an appreciable percentage are free; bushes moderately strongly attacked are always reverted; though it is possible to have very reverted bushes that are not attacked, it is not possible to have bushes that are heavily attacked that are not reverted; an attack of the mite in the first year causes a bush to become more reverted in the second year than if it had remained free from attack.

LEES (A. H.) & PEREN (G. S.). **Spraying Trial for Control of Logan Beetles.**—*Ann. Rept. Agric. & Hortic. Res. Sta., Long Ashton, Bristol*, 1921, pp. 67–69. [Received 17th July 1922.]

In view of the results obtained against *Byturus tomentosus* in the previous year [*R.A.E.*, A, ix, 414] a third spray was applied during 1921 on the 2nd June when the bushes were in full bloom. In all cases the spray used consisted of 4 lb. lead arsenate and 100 gals. water. The average infestation of the sprayed berries was 4·4 per cent., whereas the unsprayed ones showed an average of 19·8 per cent. The results are considered satisfactory, and it is hoped that the same amount of control may be obtained for some three years in succession; in this case spraying may be dispensed with for at least one or two years.

WOLFF (M.) & KRAUSSE (A.). **Ein Nachwort zum Streit über den Rapsglanzkäfer.** [A Final Word in the Controversy regarding *Meligethes aeneus*.]—*Ill. Landwirtschaftl. Zeitg.*, xli, 1921, pp. 243–244, 250–251. (Abstract in *Centralbl. Bakt., Paras. Infektionskr., Jena*, IIte Abt., lvi, no. 17–22, 14th July 1922, pp. 435–437.)

The authors are of opinion that in the case of severe infestations by rape-beetles most of the injury is actually due to species other than *Meligethes aeneus*, F., among which *Ceuthorrhynchus assimilis*, Payk., is the most important. This view has been confirmed, they state, by

recent experiments, which have convinced them that *C. assimilis*—especially its young adult and its pod-eating larva—and other allied weevils are mainly responsible for the damage to rape. At the culminating point of the outbreak studied, the parasite, *Trichomalus fasciatus*, Thor., was present. Besides *C. assimilis*, *C. sulcicollis*, Payk., and *C. napi*, Sch., do damage to rape that has been hitherto ascribed to *M. aeneus*. The adults destroy the blossoms, the buds and flower-organs such as the pistils. The larvae of *C. napi* also injure parts of the flower. Other destroyers of the flowers are various beetles, including the adults of *Baris* spp., and some Cecidomyiids and Thysanoptera. The damage due to flea-beetles is unimportant.

The success of the rape crops depends chiefly on *C. assimilis*, the food-plants of which are Cruciferae, particularly mustard ; the female lays 1–3 eggs in the very young pods, the puncture closing up entirely. Oviposition lasts right into June. Unripe seeds serve as food for the larvae, which often destroy all the seeds in a pod. The infested pods become discoloured, and are often deformed and open prematurely from June onwards, causing the larvae to fall to the ground. Pupation occurs at a depth of about $1\frac{1}{2}$–$2\frac{1}{2}$ inches in ploughed soil and lasts 2–4 weeks. The young adults usually appear before mid-July, and, together with adults from the preceding year, they attack the buds and flowers. The sexually immature adult hibernates in the stubble or superficial ground layer, and usually emerges before mid-April. In warm weather the adults have a very lively flight-period, and they then disappear among the other Coleoptera infesting rape.

In infestation by *C. sulcicollis* galls are found on the roots.

The cultivation of mustard favours *C. assimilis*, the presence of weeds and clay soils being other favourable factors. Deep ploughing under of the stubble is the direct measure recommended.

Van d. Vlist (P.). **Een Paar minder bekende schadelijke Insekten.** [Two less-known injurious Insects.]—*Maandbl. nederland. pomolog. Vereenig.*, 1921, pp. 46–47. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17–22, 14th July 1922, p. 451.)

The sawfly, *Hoplocampa testudinea*, has been recently a common pest, causing the fall of young apples and pears. Spraying with 0·1 per cent. Paris green, the removal of infested fruits and digging up the soil are the measures advocated. This spray may also be used against the pear gall midge, *Contarinia pyrivora*, which chiefly attacks the late varieties, but spraying with repellents just before blossoming seems more promising.

Wahl (B.). **Zur Bekämpfung des Apfelblütenstechers.** [A Contribution to the Work against the Apple Blossom Weevil.]—*Wiener landw. Zeitg.*, lxx, 1920, p. 12. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17-22, 14th July 1922, p. 451.)

None of the remedies advocated against *Anthonomus pomorum* are sufficiently thorough. The method recommended by Kurtz, of strewing gallnut meal (a waste product from tanneries) around the trees [*R.A.E.*, A, viii, 325], seems worthy of trial. It is also necessary to ascertain what effect this repellent has on *A. cinctus*, which oviposits on the pear in autumn.

REICHERT (A.). **Die Apfelmotte** (*Argyresthia conjugella*, **Z.**). [The Apple Moth, *A. conjugella*.]—*Der Lehrmeister i. Garten u. Kleintierhof*, xviii, 1920, p. 225. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17–22, 14th July 1922, pp. 451–452.)

In the Lüneburger Heath region (North Germany) many varieties of apple are attacked by *Argyresthia conjugella*, Z. The chief food-plant is the service berry, the fruits of which should be collected before the larvae are mature. Other measures include the cleaning of the apple trunks in winter, the digging up and treading down of the ground beneath the branches in autumn or early spring, traps, the painting of the trunks with an adhesive or the hanging among the branches of rods coated with adhesive.

HOLLRUNG (—). **Eine für Deutschland neue Erkrankungsform der Kartoffel: Nematoden!** [Nematodes: A Potato Disease new to Germany.]—*Dtsch. Landwirtschaftl. Presse*, xlviii, 1921, p. 507. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17–22, 14th July 1922, p. 492.)

A heavy infestation of potato roots by *Heterodera radicicola*, Greef, is recorded. The leaves were blackened, the roots were in a state of dry rot and the tubers were rather small. The female Nematodes were firmly attached to the roots. It is noted that *Tylenchus* infests the tubers and not the roots of the plant.

ZIMMERMANN (H.). **Nematodenbefall** (*Heterodera*) **an Kartoffeln.**—*Dtsch. Landwirtschaftl. Presse*, xlviii, 1921, p. 561. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17–22, 14th July 1922, pp. 488–489.)

The author believes that the disease of potatoes attributed in the above paper to *Heterodera radicicola*, Greef, is identical with the infestation noticed by him in Mecklenburg since 1913; he gives an account of the latter which is substantially the same as in a paper already noticed [*R.A.E.*, A, viii, 466]. It is doubtful whether *H. schachtii*, Schmidt, or a new form related to it was concerned.

RAMBOUSEK (F.). **Prognose der Rübenschädlinge.** [The Forecasting of Beet Pests.]—*Zeitschr. f. Zuckerind. d. čechoslov. Repub.*, xlv (N.F. 2), 1921, pp. 211–212. (Abstract in *Centralbl. Bakt., Paras., Infektionskr., Jena*, IIte. Abt., lvi, no. 17–22, 14th July 1922, pp. 522–523.)

In Czecho-Slovakia most sugar-beet pests appear only towards the end of June, *Atomaria, Silpha, Julus* and wireworms being exceptions. The pests should therefore be combated before planting beet. For forecasting their occurrence attention should be paid to the preceding crop, adjacent fields and the borders of the beet-field. Baits must be used as indicators. Clover and similar fodder-crops are always followed by numerous beet pests, and when clover is ploughed in, the dying roots provide a temporary abundance of food for many pests that are later driven by hunger to attack beet. In 1921 clover and corn were infested with Enchytraeids, particularly *Enchytraeus galba*, Hoffm., and *E. buchholzi*, Vejd., together with wireworms and Melolonthid larvae.

The first-named never did direct injury to healthy beets. The best remedy is dusting the fields with lime after heavy rain. In dry weather the ground should be ploughed up on sunny days to let it dry. *Heterodera schachtii* tends to disappear as the planting of beet after beet is now less practised. If the dry weather lasts beyond May a mass infestation by the black aphis [*Aphis rumicis*] is to be expected, and supplies of nicotine should be kept ready. In 1921 *Atomaria linearis* and millipedes were common.

Un Ennemi de la Betterave : La Casside nébuleuse.—*La Terre Vaudoise, Lausanne*, xiv, no. 25, 24th June 1922, pp. 317–318, 1 fig.

Beet in Switzerland is attacked by *Cassida nebulosa*, a well-known Chrysomelid pest of this crop. After hibernation the beetles mate in spring, and eggs are laid on the upper surface of beet leaves. Though the adults eat the leaf-tissue, it is the larvae that do most of the harm. There are usually two generations a year. As *Chenopodium album* is a favourite food-plant, this weed should be cleared from the infested beet-fields. Early sowing produces vigorous plants before the infestation begins. The destruction of the adults is important; traps for them may be baited with decomposing meat. The larvae can be destroyed by poultry or by spraying. While colza oil or petroleum emulsions are satisfactory, the best results are obtained with arsenicals. If the plants are sprayed with Paris green or sodium arsenite when the first larvae appear, the latter will be killed without any injury being done by the spray.

Parasites de la Vigne : Eudémis.—*La Terre Vaudoise, Lausanne*, xiv, no. 27, 8th July 1922, p. 347.

Polychrosis botrana, Schiff., was first observed in Switzerland in 1910 in the Canton of Geneva. Since then it has spread in the vine-growing areas. Being of southern origin, it is favoured by dry, hot years such as cause a decrease in the numbers of *Clysia ambiguella*, Hb.; the latter has been very scarce in 1922 after the exceptionally hot weather of 1921. This displacement of *C. ambiguella* by *P. botrana* is undesirable, for the latter has three generations a year, whereas the former has two only.

Miller (D.). **Insect Notes: 1921-22 Season.**—*N.Z. Jl. Agric., Wellington*, xxiv, no. 5, 20th May 1922, pp. 294–296.

The insect pests of fruit recorded during 1921–22 include *Aemona hirta* (lemon tree borer) in gooseberries and lemons, *Aspidiotus epidendri* on palms, *A. rapax* (greedy scale) on various plants, *Diaspis* (*Aulacaspis*) *rosae* (rose scale) on loganberries and raspberries, *Bryobia practiosa* (*pratensis*) (red mite) and *Coccus hesperidum* (soft scale) on apples, *Ctenopseustis obliquana* (oblique tortrix) on apple and grape-vine leaves, *Eriophyes tristriatus* (walnut leaf-mite) on walnut leaves, *Charagia virescens* (ghost moth) in nectarine trees, *Oeceticus omnivorus* on foliage of fruit trees, *Tetranychus* (*Schizotetranychus*) *mytilaspidis* (citrus red spider) on lemon trees, and *Cydia pomonella* (codling moth), *Typhlocyba australis* (apple leaf-hopper), *Eriocampoides limacina* (pear and cherry slug), *Perrisia pyri* (pear leaf-rolling midge), and numerous scale-insects in orchards.

Field-crop and garden pests include *Agrotis ypsilon* (greasy cutworm) attacking rape and root crops, particularly mangels, *Bruchophagus funebris* (clover-seed chalcid) and *Aphis bakeri* (clover aphis) infesting clover seed, *Tylenchus tritici* (cockle eelworm) in wheat, *Melanchra insignis* on flowers and leaves of bulbous plants, *Odontria zealandica* (crown chafer), *Pyronota festiva* (small green chafer) and *Stethaspis suturalis* (large green chafer) on roots of garden and field plants, the adults of *O. zealandica* also on foliage of fruit trees, *Phytometra* (*Plusia*) *chalcites* on maize and other cereals and on tobacco plants, *Porinia* spp. on pasture and lawns, *Herse* (*Sphinx*) *convolvuli* on foliage of the kumara [*Ipomoea batatas*], *Rhizoglyphus echinopus* (onion mite), *Notophallus bicolor* (blue oat mite), *Cecidomyia oleariae* on the young shoots of *Olearia*, and the usual outbreaks of *Cirphis unipuncta* and *Melanchra composita*.

Household and stored product pests include *Necrobia rufipes* in a tin of dried milk, *Porcellio scaber* infesting dwellings, *Carpophilus aterrimus* in dried fruit, *Lasioderma serricorne* (cigarette beetle), *Silvanus surinamensis* (saw-toothed beetle) and *Ptinus fur* in dates, the last-named also occurring in grain stores with *Calandra granaria*, *C. oryzae*, and *Ephestia kühniella*.

Pests intercepted in quarantine were *Ceratitis capitata* (Mediterranean fruit-fly), *Dacus passiflorae*, *Lonchaea splendida* (tomato fly) and *Chrysomphalus aurantii* (red scale) on oranges from Australia; *Carpophilus aterrimus* in water-chestnuts and *Plodia interpunctella* on peanuts and walnuts from China; *Merodon equestris*, *Muscina stabulans* and *Rhizoglyphus* sp. in hyacinth bulbs from Holland; a coconut fly from Fiji; and a Psyllid (*Rhinocola* sp.) on boronias, country unspecified.

MYERS (J. G.). **The Order Hemiptera in New Zealand, with Special Reference to its Biological and Economic Aspects.**—*N.Z. Jl. Sci. & Technol., Wellington*, v, no. 1, March 1922, pp. 1-12. [Received 18th July 1922.]

The Rhynchota of New Zealand are far from being well known, although this group is a very important one from the economic aspect. The species are dealt with under 26 families, and it is hoped that the data given will encourage further study of the group.

GOWDEY (C. C.). **Prevention and Control of Insect Pests.**—*Jl. Jamaica Agric. Soc., Kingston*, xxvi, no. 5, May 1922, pp. 357-363.

The various causes of injury to plants, and the general methods for their prevention and control are here outlined, and formulae for the use of insecticides and fungicides are given. Thorough preparation and cultivation are of great importance in the prevention of diseases, and the greatest advances to be made in their control are in the development of resistant varieties of crops by hybridisation and selection.

FERNALD (H. T.) & BOURNE (A. I.). **Injury to Foliage by Arsenical Sprays. I. The Lead Arsenates.**—*Massachusetts Agric. Expt. Sta., Amherst*, Bull. 207, April 1922, 19 pp., 23 figs.

This bulletin reports the results of work with various lead arsenates to ascertain the factors responsible for foliage injury following arsenical spraying. It appears that the difference in sensitiveness between the

upper and lower surfaces of the leaves is negligible. Where insects or fungi had produced holes in the leaves, spray injury was observed around the edges of these holes, but if the rest of the leaf was not affected such injury was not rated as injury by spraying. Injury did not usually appear until a week after spraying, increasing in severity later, but in general the final degree of injury had been reached after about 12 days. Pear and elm proved the most resistant of the trees used in the experiments; apple came next, but was much less resistant; then came cherry, Bradshaw plum and peach. No injury either from the pure or commercial materials was obtained with a combination of lower temperatures and humidities, but traces began to appear as these factors became higher. It was shown that with reasonably good materials injury is caused by temperature, humidity and perhaps light, and an analysis of these effects proved that the neutral lead arsenate used, though not entirely pure, was the safest material in clear weather, and in most cases was better in cloudy weather than the others. Clear weather spraying is safer than cloudy weather, but the difference is not great. Spraying at high temperatures is safe if the humidity is low, and at high humidities if the temperature is low, though the humidity cannot run up as high as the temperature. The experiments have failed to answer the question why arsenical sprays sometimes injure foliage, but they have shown that some of the explanations given can be rejected, viz., that the arsenic (AS_2O_3 or AS_2O_5) was present in the material uncombined with any base; that it was so loosely combined with the base as to become liberated during the addition of water in preparing it for application: or that injury was due to the presence of injurious impurities in the material.

COAD (B. R.), TUCKER (E. S.), WILLIAMS (W. B.), BONDY (F. F.) & GAINES (R. C.). **Dispersion of the Boll Weevil in 1921.**—*U.S. Dept. Agric., Washington, D.C.*, Dept. Circ. 210, 23rd February 1922, 3 pp., 1 map. [Received 18th July 1922.]

The cotton boll weevil [*Anthonomus grandis*, Boh.] has now reached the limit of cotton cultivation in the United States, except in western Texas, south-western Oklahoma, north-eastern North Carolina and Virginia. The situation in the various States is briefly outlined. In all, 66,662 square miles of new territory were invaded by the weevil in 1921, making a total of 600,771 square miles. About 105,000 square miles of cotton territory are still uninfested. A map shows the spread of the weevil from 1892 to 1921, and tables record the movement of the pest in 1921 by States and the proportion of the cotton crop of each State produced in uninfested land. Only 5·4 per cent. of the crop from the cotton belt originates from uninfested land.

MILBRATH (D. G.). **Control of Diseases of Cucumbers in Greenhouses.** —*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 5–6, May–June 1922, pp. 430–437, 4 figs.

The only insect pests dealt with are *Aphis gossypii*, Glover (melon aphis), *Diabrotica vittata*, F. (striped cucumber beetle) and *D. duodecimpunctata*, Oliv. (twelve-spotted cucumber beetle), which are carriers of mosaic disease, and *Heterodera radicicola*, Greef, which causes root-knot in the plants.

Screening, periodical fumigation and the destruction of wild host-plants of mosaic disease are recommended against the former and sterilisation or removal of soil against *H. radicicola*.

COMPERE (G.). **Origin of Fumigation with Hydrocyanic-acid Gas in California.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento,* xi, no. 5–6, May–June 1922, pp. 438–442, 2 figs.

The history of hydrocyanic acid gas fumigation for the control of *Icerya purchasi*, Mask. (cottony cushion scale) in California is reviewed. With the discovery and introduction of the Australian Coccinellid, *Novius* (*Vedalia*) *cardinalis*, which has proved an effective check on the scale, further experiments with artificial methods ceased.

ESSIG (E. O.). **The Artichoke Plume Moth** (*Platyptilia* **sp.**).—*Mthly. Bull. Cal. Dept. Agric., Sacramento,* xi, no. 5–6, May–June 1922, pp. 454–456, 1 fig.

The identity of the species concerned is somewhat doubtful. It has been determined from reared adults as *Platyptilia acanthodactyla*, Hb., by Tate, this species being found both in Europe and the United States, but the coloration of the larvae differs from that of the overwintering individuals collected by the author, which resemble more those of *P. carduidactyla*, Riley. It is possible that more than one species may be involved, and it is hoped definitely to settle the identity during the coming season. The larvae are particularly active and injurious during March, April and May, the developing heads of the artichoke being their favourite food, but they will also eat into the stems or bracts and portions of the leaves. Pupation begins in April. There are at least two broods in the year, possibly three or four. The maximum emergence of adults occurs in September according to Tate, who has also found the larvae feeding on European milk thistle (*Silybum marianum*), which occurs generally along the coast region of the State.

Light traps may be used to great advantage for the adults in April, May and June, and again in August and September. Various methods for the control of the larvae are being tried. In this connection it is suggested that the thistle food-plants should be removed in the spring and kept down throughout the year. The refuse remaining after the artichokes are cut down should be ploughed under very deeply or destroyed. Sprays, consisting of 2 lb. powdered zinc arsenite or 3 lb. powdered lead arsenate to 100 U.S. gals. water, or ¾ U.S. pint 40 per cent. nicotine sulphate to 100 U.S. gals. water with 5 lb. fish-oil soap as a spreader, may prove effective in controlling the larvae. The dusts suggested for experiments are 1 part powdered zinc arsenite or powdered lead arsenate to 3 parts hydrated lime, or 5 per cent. and 10 per cent. nicodust or nicotine dust.

If the sprays and dusts are applied immediately after picking, the small developing buds may be coated without danger to the consumer; at this period the larvae are generally in the leaf axils at the bases of the buds or feeding on the outside of them.

ESSIG (E. O.). **Nematodes attacking Dahlia Tubers.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento,* xi, no. 5–6, May–June 1922, pp. 465–466, 1 fig.

Nematode infestation of dahlia tubers may be easily overlooked. A brief account is given of the appearance of diseased tubers and the best method of determining such infestation.

Essig (E. O.). **Note on the Two New Blister Mites.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 5–6, May–June 1922, p. 466.

The fig blister mite [*R.A.E.*, A, x, 250] is thought to be a new species and has been given the manuscript name of *Eriophyes fici* by H. E. Ewing. The species attacking blackberry [*loc. cit.*] has been determined as *E. gracialis*, Nalepa.

Penny (D. D.). **Notes on the Use of Glucose-arsenic as an effective Poison against the Fruit-tree Leaf-roller.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 5–6, May–June 1922, p. 469.

The addition of small amounts of glucose increases the efficacy of poison sprays for use against *Tortrix* (*Archips*) *argyrospila* (fruit-tree leaf-roller). The sprays tried were 7½ and 15 lb. of neutral lead arsenate and 6 and 12 lb. of acid lead arsenate to a 200 U.S. gal. tank, with the addition of 2½ U.S. gals. of corn syrup (glucose).

The larvae were nearly all fully developed when the work was carried out. The most rapid results were obtained, as was expected, with the greater strength of acid lead arsenate, the killing effects of the other strengths being more or less proportional to the amount of actual arsenic in the mixture.

Strong (L. A.). **Bureau of Plant Quarantine. Synopsis of Work for the Months of January and February 1922.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, xi, no. 5–6, May–June 1922, pp. 471–476.

The pests intercepted during January and February were: From Arkansas, *Cathartus* sp. on sweet potatoes. From Florida, *Lepidosaphes beckii* on oranges; *L. beckii*, *L. gloveri*, *Chrysomphalus aonidum*, *Parlatoria pergandei* and an undetermined black scale on grapefruit; and *L. beckii* on *Camellia*. From New York, undetermined Lepidopterous larvae in Brazil nuts; *Plodia* sp. in peanuts; *Parlatoria pergandei* and *L. beckii* on Florida grapefruit; and *Cydia pomonella* and *Aspidiotus perniciosus* on apples. From Oregon, *Heterodera radicicola* on potatoes and apricot and apple trees; *Cydia pomonella* in apples; and *Aegeria* (*Sanninoidea*) *opalescens* in peach trees. From Texas, *Aleurodes* on agarita plants; *Sannina uroceriformis* in persimmon trees; and *Parlatoria pergandei* and *Lepidosaphes beckii* on grapefruit. From Washington, *Heterodera radicicola* in potatoes. From Colorado, *Lepidosaphes beckii* and *P. pergandei* on Florida grapefruit. From Illinois, *Aspidiotus perniciosus* on apples; and *L. beckii* and *P. pergandei* on Florida grapefruit. From Louisiana, *P. pergandei* and *L. beckii* on Florida oranges. From Ohio, *P. pergandei* and *L. beckii* on Florida oranges; and *A. perniciosus* on apples. From Utah, *L. beckii* and *P. pergandei* on Florida grapefruit. From Nevada, *Heterodera radicicola* in potatoes. From Missouri, *Aegeria* (*Sanninoidea*) *exitiosa* in peach trees. From Nicaragua, undetermined Coccids on chayotes. From Mexico, undetermined borers in sugar beets; *L. beckii* on oranges; and *Heliothis* (*Chloridea*) *obsoleta* in tomatos. From New Mexico, *Cydia pomonella* in apples. From Central America, *Aspidiotus cyanophylli*, *A. cydoniae*, *Chrysomphalus scutiformis*, *Pseudococcus maritimus*, *P. longispinus* and *Icerya* sp. on bananas. From Peru, undetermined Lepidopterous larvae in cotton seed. From Canal Zone, *Lepidosaphes beckii* on oranges. From Brazil, *L. beckii* on oranges. From Chile, *Diaspis boisduvali*, *Chrysomphalus biformis* and *C. dictyospermi* on orchids. From Hawaii, *Aspidiotus lataniae*, *A. persearum*, *Ripersia palmarum*, *Chrysomphalus aonidum*,

C. dictyospermi, *C. aurantii*, *Hemichionaspis minor*, *Phenacaspis inday*, larvae of *Hyposmocoma* and *Prenolepis* sp. and undetermined Coccids on coconuts; *Diaspis bromeliae* and *Pseudococcus bromeliae* on pineapple; *D. bromeliae*, *P. bromeliae* and *Coccus elongatus* on betel leaves; *Hemichionaspis aspidistrae* on oranges; and *Saissetia nigra* on *Hibiscus* cuttings. From Porto Rico, *Lepidosaphes beckii* on oranges. From Haiti, undetermined Lepidoptera and weevils in cacao beans. From Tahiti, *Chrysomphalus aurantii* on oranges and lemons and *Lepidosaphes beckii* on limes. From Australia, *Chrysomphalus aurantii* and *Pseudococcus* sp. on coconut. From China, *Parlatoria* sp. on pomelo and *P. pergandei* on orange. From Japan, undetermined Lepidopterous larvae in chestnuts, beans and pears; *Lepidosaphes* sp. on pears; and *Parlatoria pergandei*, *Hemichionaspis aspidistrae* and *Pseudaonidia trilobitiformis* on orange. From Siam, *Chrysomphalus aurantii* and *Hemichionaspis aspidistrae* on pomelos. From Spain, undetermined Lepidopterous larvae in almonds.

CALVERT (P. P.). **Methods for expressing the Associations of Different Species.**—*Ecology* [*Brooklyn, N.Y.*], iii, no. 2, April 1922, pp. 163–165. [Received 20th July 1922.]

Hacker's method for studying the typical distribution of species [*R.A.E.*, B, ix, 73] is discussed and is compared with that of Forbes, devised in 1907. It is suggested that it will be interesting to test both methods by data derived from other groups of organisms.

BONDAR (G.). **Os Insectos damninhos. xxi. Uma Lepidobroca da Batata doce,** *Megastes pucialis*, **Saell.** [Injurious Insects. xxi. *M. pucialis*, a Caterpillar infesting the Sweet Potato.]—*Chacaras e Quintaes, S. Paulo*, xxv, no. 6, 15th June 1922, pp. 473–474, 2 figs.

A Pyralid, *Megastes pucialis*, Saell., is an important sweet potato pest in the State of Bahia, Brazil. In that region it breeds throughout the year, but the main injury occurs in winter (May–August). The larvae mine the stems, which swell and may harbour as many as five or six individuals. From this point they bore into the branches and root, which becomes hypertrophied. If the attack extends to the tubers they are rendered useless. The presence of the larva is revealed by the excreta near the collar of the plant or by the death of the stems. Even if they do not die, infested stems can be recognised in hot sunshine because they wither more quickly than the others. Pupation takes place in a silken cocoon in the stem. The pest is most troublesome at the time sweet potatoes are planted in June to August, fifty per cent. of the plants being sometimes destroyed.

The moth breeds on various Convolvulaceae and migrates from them to sweet potato. This crop should be planted during the summer rains (January to April) so as to have reached full growth when the attack begins.

WEISE (J.). **Ueber einige amerikanische und australische, nach Südfrankreich eingeführte Coccinelliden.** [Some American and Australian Coccinellids introduced into the South of France.]—*Wiener Ent. Zeitg., Vienna*, xxxix, no. 1–4, 30th March 1922, p. 104. [Received 20th July 1922.]

The Coccinellids in question are *Hippodamia convergens*, imported from North America to check Aphids on fruit trees, and two Australian

enemies of the Coccid pests of citrus, *Cryptolaemus montrouzieri* and *Novius* (*Macronovius*) *cardinalis*. The climate of the south of France seems very favourable to *H. convergens*, as examples from there are usually larger than those from North America.

PRIESNER (H.). **Ueber albanische Thysanopteren.** [On Albanian Thysanoptera.]—*Wiener Ent. Zeitg.*, *Vienna*, xxxix, no. 1–4, 30th March 1922, pp. 105–107. [Received 20th July 1922.]

A new species, provisionally placed in the genus *Trichothrips*, is here described as *T. infernus* from a female taken at Mamuras, Albania.

Some corrections in the nomenclature of the author's paper on Albanian Thysanoptera [*R.A.E.*, A, ix, 588] are given.

RAMBOUSEK (F.). **O Katastrofálním Rozšíření Zavíječe Řepového** (*Phlyctaenodes sticticalis*, **L.**). [On the disastrous Invasion by *Loxostege sticticalis*, **L.**]—*Zpráva Výzkumného ústavu cukrovarnického* [*Bull. Sugar Manuf. Expt. Inst.*], *Prague* Ent. příručky, x, 1922, 26 pp., 14 figs. [With a Summary in French.]

An account is given of the outbreak of *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., in Czecho-Slovakia [*R.A.E.*, A, x, 342].

In addition to the parasites already mentioned [*R.A.E.*, A, x, 343], the following Hymenoptera are recorded: *Apanteles* sp. (near *ruficrus*, Hal.), *Phytodietus segmentator*, Grav., and *Pimpla examinator*, F.

JACKSON (D. J.). **Bionomics of Weevils of the Genus** *Sitona* **injurious to Leguminous Crops in Britain. Part ii.** *Sitona hispidula*, **F.**, *S. sulcifrons*, **Thun.**, and *S. crinita*, **Herbst.**—*Ann. App. Biol.*, *Cambridge*, ix, no. 2, June 1922, pp. 93–115, 1 plate, 5 figs.

Sitona hispidula, F., the stages of which are described, is widely distributed throughout Europe and America, and has also been recorded from Western Siberia. In the British Isles it is a common pest of all species of clover (*Trifolium*), lucerne (*Medicago sativa*) and medick (*M. lupulina*), and is occasionally found on peas. In Maryland, it has been reported as attacking Lima beans. The adults begin to feed at the edge of the clover leaves and bite out irregular notches. The larvae bore deeply into the main root, and frequently damage it just below the crown, so that the shoot just above the damaged area dies. The greatest damage is done in June and July, when the larvae are most abundant. There is one generation in a year, the adults living about 12 months. They begin to appear from July to September and oviposit from about 6 weeks later, continuing to lay eggs occasionally during the winter and resuming vigorously in the spring. About the end of June oviposition ceased, and in July most of the weevils died. Eggs laid in the autumn did not hatch until the following spring, otherwise the incubation period was about 25 days. Larvae hatching from eggs laid in September and October required 15–16 weeks to reach maturity; those from eggs laid from mid-April to 21st July required only about 11 weeks. During fine weather in September and October the beetles are very active and can be swept in numbers from clover or lucerne. In America the life-cycle is much shorter.

In the course of these investigations, the Braconids, *Perilitus rutilus*, Nees, *P. aethiops*, Nees, and *Pygostolus falcatus*, Nees, have been bred

from the adult beetles, and single Hymenopterous larvae have been found on several occasions in the bodies of adults. Gregarines have been frequently observed in the alimentary canal of adults of *S. hispidula* and also of *S. puncticollis*; but the fungus, *Botrytis bassiana*, seems to be the most serious natural enemy of both adults and larvae of *S. hispidula*.

S. sulcifrons, Thun., has been recorded throughout Europe and in the Caucasus, and damage by it to leguminous crops has been observed in France, Germany and Russia. In the British Isles it is widely distributed and is common on red clover, especially in the north of Scotland. Other species of clover and bird's-foot trefoil (*Lotus corniculatus*) are also infested; in Europe it has been recorded damaging peas, clover, lucerne and buckwheat. The damage done by the adults is very similar to that by *S. hispidula*, except that the shape of the eaten-out areas is more regular; the larvae feed principally on the root nodules of clover or the small fibrous roots, but never seem to attack the main root. The stages of this species are described, as well as the characters distinguishing it from other species. The life-history, which is given in detail, closely resembles that of *S. hispidula*. Insect parasites appear to be rare; the Braconids, *Perilitus cerealium*, Hal., and a species of *Liophron* have been bred from the adults, and single Hymenopterous larvae have occasionally been found in the bodies of the beetles. The fungus, *B. bassiana*, also attacks this species.

S. crinita has been recorded as an important pest of peas and beans in England, and has therefore been included in the present research, though the author has never found it seriously abundant. In Kent frequented the same food-plants as *S. lineata* [*R.A.E.*, A, ix, 17 but was always greatly outnumbered by the latter. The weevils semi-circular patches in the leaves; the larvae feed upon the r nodules and occasionally tunnel in the main root. The adul described and compared with species likely to be confused wit The life-history is very similar to that of *S. lineata* [*loc. cit.*] Braconid (*Perilitus* sp.) has been bred from an adult of *S. cr* and single Hymenopterous larvae have been found within the b of the beetles; the fungus, *B. bassiana*, also attacks the adults.

DAVIDSON (J.). **Biological Studies of *Aphis rumicis*, Linn. Re duction on Varieties of *Vicia faba*.**
FISHER (R. A.). **A Statistical Appendix.**—*Ann. App. Biol.*, Cam ix, no. 2, June 1922, pp. 135–145, 1 fig.

In continuation of previous work [*R.A.E.*, A, ix, 404] the va reproductive capacity of *Aphis rumicis* on 18 different varie field beans was tested. The methods employed are describe Aphids used in the experiments were the offspring of one fu and all were kept under similar conditions. Five plants of each were used, and the total number of Aphids produced on each from one apterous viviparous female in 14 days was counted show the results obtained and are compared with those obta prolific longpod beans, which are taken as the standard (100 per for fixing the relative values of susceptibility of other varieties average number of Aphids produced on the different varieties, each the standard, ranged from 37 to 1,037. On these infestation f the varieties are grouped into six classes, representing various gr susceptibility ranging from 98 to 3 per cent. None among the tested showed complete immunity from attack, but the Ap compelled to stay on the plants, and probably in natu

migrants would have flown to other food-plants. It is thought that the rate of reproduction is considerably affected by the influence of the cell sap on Aphid metabolism, so that, under the same environmental conditions, the chances of infestation are greater with some varieties than others.

Plant-breeding experiments would show whether susceptibility or resistance is a specific Mendelian character. The variety *Vicia narbonensis*, which is considered by many to be a prototype of the cultivated *Vicia faba* and most nearly represents the wild prototype of the modern cultivated race, has a very low susceptibility. It seems feasible to consider tentatively that the factor or factors making for high resistance may have been present in the original wild bean, and that this character has been lost or modified in the process of selection in the cultivated varieties. The improved conditions associated with good cultivation, manurial treatment, etc., may to some extent influence the degree of susceptibility to Aphid attacks, but the indications from the present tests are that these are not the only factors.

In an appendix the probable error to be discounted in these estimates of infestation is discussed from a statistical point of view.

Cunliffe (N.). **Additional Host Plants of** *Oscinella frit*, **Linn., among Grasses.**—*Ann. App. Biol., Cambridge*, ix, no. 2, June 1922, pp. 165–168.

Observations have been continued [*R.A.E.*, A, ix, 533] relating to the utilisation of certain grasses as food-plants by *Oscinella frit*. Experiments, which are outlined, were conducted to determine also the relative preference for different plants at different periods of the year. In addition to previously recorded winter food-plants, *Holcus lanatus*, *Bromus sterilis*, *Dactylis glomerata* and *Arrhenatherum avenaceum* var. *bulbosum* are now added. In each of the experiments the great majority of midges were reared on *Arrhenatherum* spp. To the previously recorded spring food-plants may be added *Agrostis alba*, *Arrhenatherum avenaceum* var. *bulbosum*, *Hordeum murinum* and *Poa trivialis*. Similar tests with cereals in the spring gave a small emergence of flies—wheat, rye, barley and maize yielding none; *Lolium italicum* gave a total of five flies and oats a total of ten.

Observations on the prevalence of the fly in the field indicate that for the years 1919 to 1921, during which the meteorological conditions were very varied, the periods of high and low prevalence tended to be constant. If this observation is confirmed for another season it would explain the fact that early sown crops suffer the least damage

Miles (H. W.). **A New Pest of Strawberries.**—*Garden, London*, lxxxvi, no. 2641, 1st July 1922, p. 318, 1 fig.

A description is given of *Geotrupes spiniger*, Marsh., which was found infesting strawberry plants at Bristol. The presence of the larvae on beds where manure was forked in during the winter is possibly due to the female being attracted thereby for egg-laying. If only a small amount of manure is left they move about and feed on the roots or any available vegetable matter. It is also possible that they feed on other organic material if the food prepared by the adult is insufficient. When the larvae feed on the roots their development

is slower and the larval stage lasts about two years. In captivity the pupal stage lasted about ten weeks, the adults emerging towards the end of April. Little is known regarding the length of life of this beetle, but an allied species, *G. stercorarius*, is said to have lived as long as three years and six weeks [*R.A.E.*, A, v, 21].

Natural enemies include various birds. Remedial measures are good cultivation in the spring and lifting and replacing sickly or injured plants. All larvae and adults found should be destroyed.

Second Annual Report of the Forestry Commissioners. Year ending September 30th, 1921.—*London*, H.M.S.O., 1922, 44 pp. Price 1s. [Received 22nd July 1922.]

Some account of the work done on insect pests is included under the subhead of Research and Experiment.

During November 1920 a special investigation into the biology and occurrence of *Chermes cooleyi* was begun, from which it appears that, although Douglas fir [*Pseudotsuga taxifolia*] is infested, it does not succumb to the attack of this Aphid, and the destructive gall-form on Sitka spruce [*Picea sitchensis*] does not exist in this country. A full report is to be published shortly on the prevention of the further dispersal of this pest and on measures for dealing with infested nursery stock. Experiments in the control of *Hylobius abietis* are still being continued; the results so far show that bark-traps are superior to hand-picking, and that decoy billets and pit-traps tend to prevent the migration of the weevil from its breeding-ground.

Minor investigations were concerned with *Chermes* on silver fi pine and spruce Aphids, pine wood-boring beetles, insects harmful poplars, *Ips* (*Tomicus*) *laricis* (bark-beetle) and *Cladius viminal* (poplar sawfly).

EHRHORN (E. M.). **Report of Chief Plant Inspector, January 192** *Hawaiian Forester & Agric., Honolulu*, xix, no. 3, March pp. 71–72.

The pests intercepted include: From China, *Aphis* sp. on *Cal* tubers; from Florida, *Lepidosaphes beckii* on oranges; and, from Philippines, *Parlatoria pergandei* on oranges.

Scientific Department.—*Planters' Chron., Coimbatore*, xvii, no. 1st July 1922, pp. 381–382.

Cerococcus hibisci and *Ceroplastodes* sp. were found attac *Tephrosia candida*. The attack was probably largely due to the long abnormal drought, but was almost entirely confined to young cle there being very little under the shade of old rubber. With the of rain the scales were attacked by a fungus and were also he parasitised. Infested *Tephrosia* should be cut over at once; the shoots coming up with the rain will then be clean and unin If the pest is serious the crop should be rotated with *In endecaphylla*, which makes an excellent cover in young clearing.

Tea was infested with *Saissetia* (*Lecanium*) *hemisphaerica* rubber was severely attacked by a black scale, possibly *S. nigra*, with the attendant sooty fungus. This attack, following a severe one of *Phytopthora meadii* in the previous year, caused a great deal of damage to the trees.

ALLEN (W. J.). **Spraying.**—*N.S.W. Dept. Agric., Sydney*, Farmers' Bull. 72, 6th edn., March 1921, 49 pp., 3 figs. Price 1*s.* [Received 24th July 1922.]

General instructions are given for the preparation and application of sprays, arranged under the various classes of pests. Directions are also given for the preparation of fungicides, poison baits for fruit-flies, and lime and tobacco dusts.

FROGGATT (W. W.). **A Spraying Caution.**—*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 6, 1st June 1922, p. 436.

Only fresh, clean crystals of washing soda should be used in the spray for the control of white wax scale [*Ceroplastes*], as soda that has been kept in stock for some time causes injury to the foliage.

FROGGATT (W. W.). **A Mite that attacks Fruit Trees.**—*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 6, 1st June 1922, p. 456.

Bryobia praetiosa (*pratensis*) (red apple mite) is very abundant at times on apple trees, but it is not usually harmful, probably because it appears early in the winter and is destroyed by subsequent storms. In a mild season the mites may cause considerable damage to young leaf-buds and suck the sap from the trees. Any badly infested trees should be sprayed with lime-sulphur as the mites hatch.

ARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl., Brisbane*, xvii, pt. 6, June 1922, pp. 299–300.

Of 15 different methods of combating the larval stage of *Lepidoderma ohirtum* soil fumigants are considered the most likely to be successful. Arrangements are being made to introduce from Java two parasitic liids, *Dielis thoracica*, F., and *D. javana*, Lep. The life-cycle of former occupies 39–62 days.

new pest of sugar-cane, a Noctuid, *Spodoptera mauritia*, Boisd., minor importance at present.

(E.). **Early Stages of** ***Macrosiagon cucullata*****, Macl.**—*Queensland Agric. Jl., Brisbane*, xvii, pt. 6, June 1922, p. 307, 1 plate.

The Rhipiphorid beetle, *Macrosiagon pictipennis*, Lea, has been ded as an enemy of the useful Hymenopterous parasites, *eris tasmaniensis*, Sauss., and *C. radula*, F. Nothing was about its life-cycle, but an allied species, *Macrosiagon cucullata*, l., has been observed ovipositing on the lower surfaces of leaves of *s opposita* and *Urena lobata*. Experimentally the eggs hatched r 17½ days. The triungulin, or first larval stage, resembles that of *orus paradoxus*, and, like that insect, it probably frequents visited by Hymenoptera, and is carried by them into their It waits until the egg of its host hatches, then enters the body larva

(H.). **Fruit Fly Investigations. Second Progress Report.**—*Queensland Agric. Jl., Brisbane*, xvii, pt. 6, June 1922, pp. -312.

into the occurrence of *Dacus ferrugineus* (*tryoni*) have been continued [*R.A.E.*, A, x, 416]. Burning the fruit on the ground is not a reliable method of control, as the larvae enter the

soil, where they pupate. Larvae and pupae perish if immersed in water for four or five days. The fruit should be covered with at least two inches of water for five days, and can then be ploughed in for manure if desired without danger of any flies hatching.

About 20 individuals of the Braconid parasite, *Diachasma tryoni*, Cam., were liberated successfully. *Opius tryoni*, Cam., may be observed on warm days flying round and alighting on infested fruit. It can only reach the larvae when they are close underneath the skin, which is when they are full grown and on their way out of the fruit, or when they are approaching the surface in breathing. Owing to the lateness of the season and the almost entire absence of fruit, trapping experiments in fields no longer gave good results.

Larvae of *Syrphus viridiceps*, Macq., and *S. pusillus*, Frog., were extremely useful in destroying the woolly apple aphis, *Eriosoma* (*Schizoneura*) *lanigerum*. Unfortunately these flies are parasitised by a small Braconid. The larvae found in tomato have proved to be, as was anticipated, those of *Lonchaea splendida* [*loc. cit.*].

PETTIT (R. H.). **Grasshopper Bait and Kedzie Mixture.**—*Qtrly. Bull. Michigan Agric. Expt. Sta., East Lansing*, iv, no. 4, May 1922, pp. 141–142.

As white arsenic becomes lumpy after storing for some time, and therefore unsuitable for grasshopper baits, it is suggested that it should be used for the preparation of Kedzie mixture, for which the following instructions are quoted from the late Dr. R. C. Kedzie.

Complete solution of the arsenic is insured by boiling 2 lb. with 8 lb of carbonate of soda in 2 U.S. gals. of water for 15 minutes. Th may be kept as a stock solution. For spraying, 2 lb. of slaked st or lump lime added to 40 U.S. gals. of water must be mixed every U.S. quart of stock solution. The arsenic in this mixt equal to 8 oz. of Paris green. This mixture cannot be combin lime-sulphur, but may be satisfactorily used with Bordeaux. only be used for potatoes, as it is apt to cause delayed sc fruit.

McDANIEL (E.). **Cloth Moths.**—*Qtrly. Bull. Michigan Agric. Sta., East Lansing*, iv, no. 4, May 1922, pp. 143–144.

A brief account is given of the various ways of protecting househ articles and clothing from infestation by clothes moths [*R.A.E.*, A, ix, 483].

WELD (L. H.). U.S. Bur. Ent. **Notes on American Gallflies of the Family Cynipidae producing Galls on Acorns, with Descriptions of New Species.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lxi, art. 19, no. 2440, 1922, 32 pp., 5 plates, 3 figs.

Twelve new species of American gallflies are described, with a synopsis of the galls and keys for the determination of the adults.

WELD (L. H.). U.S. Bur. Ent. **Notes on Cynipid Wasps, with Descriptions of New North American Species.**—*Proc. U.S. Nat. Mus. Washington, D.C.*, lxi, art. 18, no. 2439, 1922, 29 pp., 1 plate, 3 figs.

Miscellaneous notes are given on several species of both parasitic and gall-inhabiting Cynipids, and six new species are described.

WELD (C. J.). **Studies on Chalcid-flies of the Subfamily Leucospidinae, with Descriptions of New Species.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lxi, art. 6, no. 2427, 1922, pp. 1–43, 4 plates, 2 figs.

Keys are given to the genera of LEUCOSPIDINAE, and to 34 species of the genus *Leucospis*, 13 of which are new and are described. A list is included of 40 species of LEUCOSPIDINAE described since Schletterer's monograph of 1890.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, no. 1, July 1922, pp. 17–20.

Brithys pancratii, Cyr. (lily borer) feeds in the interior of leaves and stalks, and can be successfully checked by spraying the infested plants with lead arsenate.

The wattle bagworm [*Acanthopsyche junodi*, Heyl.] has severely attacked plantations in 1922. As it is probable that the larvae are borne largely by warm winds and carried rather high in the air, screens of immune trees on the heights of a valley where the pest is serious might intercept them, but in most places they probably reach vegetation more from above than from the side.

GLENN (P. A.). **Relation of Temperature to Development of the Codling-moth.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 193–198.

The observations here described were made during 1915, 1916 and '917, and were concerned with the relation of temperature to the 'evelopment of the codling moth [*Cydia pomonella*, L.]. The purpose the study was to find some temperature unit so related to development that the total number of units accumulating during the period any stage of the insect would be the same for all temperatures. e day degree (one degree acting for a period of one day) was used he unit of temperature.

n the case of the eggs, 50° F. was the lowest temperature at which lopment took place. The rate of development increased with the g temperature up to 88°, after which it was retarded. The bation periods varied from 5·52 to 14 days, with average tempera- from 61·6° F. to 84° F. The sum obtained by multiplying the legrees above 50° by the number of days in the incubation proved to be fairly uniform for the lower temperatures; but the temperature was over 88° it was found necessary to subtract the degrees above 88° from those above 50° in order to obtain effective day degree. On multiplying these day degrees by the er of days in the incubation period, a figure in day degrees is ed that is uniform for all temperatures. To obtain the same s for the larval or pupal periods the principle is the same, though gures are slightly different, the lowest temperature at which the develop being about 50° and the pupae at about 52°, while axim um development occurs at 85° and 87° respectively; thus the ive day degree for any day may be found by subtracting twice mber of degrees above the degree of maximum development e number of degrees above the lowest degree at which develop- ccurs, the sum of the day degrees thus obtained for the entire being the theoretical thermal constant. This constant for the tion eriod is about 163, for the larval period 673, and for al iod 241. For practical purposes it is necessary to use the

same threshold of development (50°) for the pupa as for the egg or larva ; this gives a figure of 265 for the pupa.

Apart from variations caused by measurable factors, the constants still varied from 156 to 170 for the incubation period, from 527 to 873 for the larval period, and from 256 to 274 for the pupal period. Thus the effective day degrees of the three periods added together are from 939 to 1,317, with an average of 1,101. In taking the entire development as observed in 200 individuals, the minimum effective day degrees amounted to 950, whereas where records were kept of the first appearance of each stage the minimum appeared to be 1,027. To the numbers 939 and 950 another 50 day degrees may be added to allow for the accumulation between the emergence of the adult and oviposition; the minimums are therefore 989, 1,000 and 1,027, with an average of 1,005. The first individuals of a given brood may therefore be expected when 1,000 effective day degrees have accumulated after the appearance of the first individuals of the previous brood.

A spray programme is given based on the relation of accumulated effective day degrees and the time of the appearance of the first larvae of each generation, providing three sprays for the first, and two for each of the subsequent two broods, the first spray being applied when about two-thirds of the petals have fallen.

SASSCER (E. R.) & WEIGEL (C. A.). **Fumigation with Hydrocyanic-acid Gas in Greenhouses on a Commercial Basis.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 200–203.

Hydrocyanic acid gas fumigation is an effective means of controlling the more important insect pests in greenhouses without appreciable injury to the plants, provided the necessary precautions are observed. Experiments have been carried out against *Trialeurodes vaporariorum*, Westw., on *Ageratum*; *Thrips tabaci*, Lind., on carnations; *Coccus hesperidum*, L., on *Laura nobilis*; *Orthezia insignis*, Doug., on miscellaneous plants representing 101 genera; *Saissetia oleae*, Bern., on miscellaneous plants representing 15 tropical genera; *Euthrips orchidii*, Moult., on orchids; *Ischnaspis longirostris*, Sign., on miscellaneous palms; and *Typophorus (Paria) canellus*, F., on roses. The fumigant used was made up of 1 oz. avoirdupois of sodium cyanide (containing approximately 51 per cent. cyanogen), $1\frac{1}{2}$ liquid oz. of sulphuric acid (1·83 specific gravity), and 3 liquid oz. of water. To secure an equal distribution under greenhouse conditions it is necessary to use a number of generators. If used persistently, weak doses will control all common greenhouse insects without reducing the market value of the plants. The dosages tested varied from $\frac{1}{8}$ to 5 oz. according to the nature of the plants. Some plants, such as orchids and carnations, may be safely fumigated while in bloom without injury to the flowers.

CRAWFORD (H. G.) & SPENCER (G. J.). **The European Corn Borer (*Pyrausta nubilalis*, Hubn.) : Life History in Ontario.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 222–226.

An account is given of the seasonal history of *Pyrausta nubilalis*, Hb., under laboratory and field conditions in Ontario, also a list of food-plants other than maize. The date of sowing and the degree of infestation were found to be closely correlated, both in experimental and field conditions [*R.A.E.*, A, x, 385].

Weigel (C. A.) & Doucette (C. F.). **Further Observations on the Strawberry Root Worm on Roses.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 3, June 1922, pp. 204–209.

The studies of the life-history and control of *Typophorus* (*Paria*) *canellus*, F. (strawberry root worm) as a pest of roses in greenhouses [*R.A.E.*, A, viii, 312; x, 218] have been continued. The adults emerging in September and October apparently spend the winter hiding in mulch or soil and feed on clear, sunny days. After February they are frequently found on the plants and begin ovipositing towards the end of the month. Oviposition is practically continuous throughout the first eight months, the most marked periods being in March, April, June and July. The eggs are laid in curled-up dead or dried leaves, either singly or in masses up to 15. Each individual may lay as many as 216. The incubation period varies from 7 to 27 days. Upon hatching the larvae at once enter the soil, where they do considerable injury to the roots of the plant. They require from 60 to 74 days to reach maturity. Pupation occurs in the soil and lasts about 8 to 13 days. Most of the larvae and pupae are found directly in the ball of the roots. There are at least two generations a year under greenhouse conditions.

The destruction of the larvae and pupae in the soil has been tried with many substances, most of which proved useless either owing to their effect on the plants or their ineffectiveness against the insect. The best results were obtained with tobacco dust and wood ashes, and further experiments are now being carried out with these substances on a commercial scale.

Arsenical sprays had previously proved unsatisfactory, owing to the rapid growth produced by the forcing of the plants. When, however, they were applied at the rate of 4 to 5 lb. of powdered lead arsenate or calcium arsenate to 50 U.S. gals. water, at the time that the rose plants are cut back and the absence of foliage forces the beetles to feed on the green bark and buds, they proved an effective means of protecting the plants from injury during that critical stage. A certain amount of success was also obtained with one part of powdered lead arsenate to nine of superfine sulphur applied as a dust. The successful use of hydrocyanic acid gas has now been proved on a practical and commercial scale, and it was also found that muslin curtains may be successfully used to confine the gas in any section of an open range of houses.

O'Kane (W. C.). **One Year of the Crop Protection Institute.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 3, June 1922, pp. 209–213.

The first year's work of the Crop Protection Institute is briefly reviewed. A conference was held at New York on the control of the cotton boll-weevil [*Anthonomus grandis*, Boh.], and a concise statement of rules relating to dusting against this pest was prepared.

A co-operative dusting project in several States was successfully carried out under the direction of the institute, which proved the organisation to be an available means of bringing about profitable and desirable co-operation among investigators.

It has been supported by scientific workers, including members of the Bureau of Entomology and of Plant Pathology, and although the first year's work has been less extensive than was hoped, a sound basis has been laid for future enterprise.

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STRICKLAND (E. H.). **Poisoned Molasses for the Destruction of Noctuid Moths.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 214–220, 1 fig.

Considerable attention has been given to the destruction of adults as a means of controlling *Porosagrotis orthogonia*, Morr. (pale western cutworm). The methods described are light traps, molasses troughs and poisoned molasses, of which the latter gave by far the most promising results.

The most satisfactory bait consisted of a 10 per cent. solution of cane molasses diluted in water in which quassia chips had been soaked overnight at the rate of 2 oz. to the quart. A quart bottle is filled with the mixture, and in each bottle a commercial fly-pad is inserted, with 1 gm. of saccharine and 8 drops of amyl acetate. The latter is not essential, but increases the attractiveness of the bait. The weak solution of arsenic produced by the fly-pad is only slightly deterrent, and results in the moths being killed much more rapidly, so that they are unable to oviposit before death.

A piece of lamp wick (6 in.) is saturated in the solution and the end placed in the bottle and secured in position by a well-fitting cork that has been flattened slightly on the side next to the wick. The bottle is inverted and fixed to the west side of a fence post, so that it is not exposed to the direct rays of the sun till afternoon. The heat causes the contents to expand, and some of it is thus driven down the wick and on to a cloth by which the wick should be fixed to the post. This action generally continues until sunset and liberates sufficient bait to attract moths throughout the night. After the sun has set the reverse pressure in the bottle draws in sufficient air to replace the expelled liquid. Provided the variations in temperature are not too extreme, or fermentation too rapid, a quart bottle will run every evening for from 10 to 14 days. Various modifications of this method have been tried, but so far this has proved to be the most satisfactory.

One trap to every 10 rods of fencing should be sufficient if the field is free from flowering weeds, otherwise it may be necessary to erect subsidiary posts in the field.

MCLAINE (L. S.). **The Spread of European Corn Borer in Southern Ontario.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 227–231, 1 map.

Most of the information in this paper has already been noticed [*R.A.E.*, A, x, 320].

CRAWFORD (H. G.) & SPENCER (G. J.). **The European Corn Borer Control Measures.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 231–236.

The application of cultural measures for the control of the European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario is described.

The Coccinellid, *Megilla maculata*, DeG. (*Ceratomegilla fuscilabris*, Muls.) is apparently the most important insect enemy of this pest; it has been repeatedly seen devouring the egg-masses; the Tachinid, *Exorista nigripalpis*, Towns., also occurred during the spring of 1920, but cannot be considered of much importance as a means of control.

FELT (E. P.). **The European Corn Borer in New York State.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 236–238.

Nearly 5,000 square miles are infested by the European corn borer [*Pyrausta nubilalis*, Hb.] in New York. In this State under present conditions breeding in weeds, etc. is apparently restricted to the vicinity of maize. The possibility of further spread and increased infestation is pointed out [*R.A.E.*, A, x, 211].

McCOLLOCH (J. W.). **Longevity of the Larval Stage of the Cadelle.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 240–243.

Most of the literature with regard to *Tenebroides mauritanicus*, L., indicates that, as a rule, its life-cycle requires one year. Recent observations indicate the possibility of a much longer life-cycle, the larval period alone lasting from 628 to 1,248 days, with an average of 822 days for 11 larvae. Although the conditions under which these larvae were reared vary somewhat from those occurring in nature, they are not considered sufficient to account for the difference in the length of the larval period.

These observations, though not very extensive, indicate the importance of undertaking further study in connection with this beetle.

MARCOVITCH (S.). **The Strawberry Weevil cutting Apple, Tomato and Cotton Buds in Tennessee.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, pp. 244–245.

Anthonomus signatus, Say, is recorded as breeding in the buds of apple in Tennessee. The infested trees were adjacent to a strawberry patch that harboured the weevils, but whether this pest will continue to breed only in apple buds that are near infested strawberries is uncertain. Buds of tomato and cotton were found girdled, but in no instance were any eggs seen on these plants. This was confirmed in the laboratory with newly emerged weevils; these are unable to oviposit until the following season. Under natural conditions the old weevils have probably disappeared by the time the cotton squares are put out.

ESSIG (E. O.). **The Dipterous Parasite of the Cottony Cushion Scale.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, p. 246.

According to Aldrich, *Cryptochaetum monophlebi*, Skuse [*R.A.E.*, A, ii, 307; v, 11] is a synonym of *C. iceryae*, Williston, both Skuse and Knab having been mislead by a mistake in the figure accompanying Williston's original description of this Agromyzid.

SNAPP (O. I.). U.S. Bur. Ent. **Arsenate of Lead Spray for Plum Curculio kills Grasshoppers.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, p. 247.

Owing to the unusual abundance of *Schistocerca americana*, Scud., during the latter part of April in peach orchards in Georgia, poisoned bran bait had to be resorted to in some cases. Most of the feeding was done before the third lead arsenate treatment for the plum curculio [*Conotrachelus nenuphar*, Hbst.] was carried out, but when the spray, which contained 4 lb. powdered lead arsenate to a 200 U.S. gal. tank, was applied, it proved equally effective against the locusts, causing practically a hundred per cent. mortality.

LAMIMAN (J. F.). **The Italian Pear Scale on Nursery Stock.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, p. 250.

Epidiaspis piricola, Del Guer., has been recently found infesting Myrobalan plum nursery stock in California. The scales were embedded in the trunks of the seedlings just above the surface of the ground. They were so well hidden as to have passed inspection in two counties. The danger of the dissemination of the pest by this means is evident.

LAMIMAN (J. F.). **Two Mealy Bugs found in Ants' Nests.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, p. 257.

In California *Pseudococcus longisetosus*, Ferris [*R.A.E.*, A, viii, 187] has been found associated with ants on roots of poison oak (*Rhus diversiloba*), and *Phenacoccus colemani*, Ehrh., described from *Rubus* sp., has now been found associated with ants under rocks and feeding on grass roots.

ESSIG (E. O.). **The Dried Fruit Beetle.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 3, June 1922, p. 260.

Carpophilus hemipterus, L., breeds freely in stored dried fruits in the warmer valleys of the interior of California, but is not so serious a pest as *Plodia interpunctella*, Hb. Figs are apparently the preferred food and are infested both in the store-houses and in the orchards, particularly when there is any indication of souring; and the beetle also breeds freely in smutty figs, decaying melons or apples, and any other rotting organic matter.

AINSLIE (G. G.). U.S. Bur. Ent. **The Corn Leaf-tier,** *Lerema accius*, **S. & A.**—*Florida Ent., Gainesville*, vi, no. 1, June 1922, pp. 1–4 & 10–14.

The Hesperid, *Lerema accius*, S. & A. (corn leaf-tyer), although not known to cause appreciable damage, is a potential pest of maize, which is its preferred food-plant, others being American wistaria (*Bradleya frutescens*), sorghum, upland rice and several native grasses. The life-cycle, from egg to adult, required 65 days in the spring of 1913, so that there may be several generations annually; it is probably a continuous breeder in its permanent range in the south-eastern States, and travels northward every summer and is killed in numbers each winter. The eggs are laid singly and widely scattered on the leaves, and the incubation period appears to be about nine days. The young larva rolls the edge of a leaf over until it forms a tube tied down with silken threads. It remains within the tube in the daytime, feeding on the leaf, and at night emerges and attacks the same or other leaves. The larval period occupies about 42 days, after which pupation, lasting about 14 days, takes place on the leaf, under silken threads.

The Chalcid, *Xenufens ruskini*, Gir., has been observed emerging from the egg of *L. accius*; a Braconid, *Microdus* sp., has been reared from the larva; and another Chalcid, *Euplectrus insuetus*, Gah., also emerged from the larva. There are probably other parasites not yet observed, and the normal scarcity of larvae may be due to their activities.

Felt (E. P.). **A New and Remarkable Fig Midge.**—*Florida Ent., Gainesville*, vi, no. 1, June 1922, pp. 5–6.

Both sexes of *Ficiomyia perarticulata*, gen. et sp. n., were reared from the fruit of *Ficus aurea* in Florida.

Watson (J. R.). **Another Camphor Thrips.**—*Florida Ent., Gainesville*, vi, no. 1, June 1922, pp. 6–7.

Karnyia weigeli, gen. et sp. n., is described from camphor infested with camphor scale, *Pseudaonidia duplex*, at New Orleans.

Merrill (G.). **Three Scales New to Florida.**—*Florida Ent., Gainesville*, vi, no. 1, June 1922, p. 15.

Three species of Coccids have recently been added to the list of those known to occur in Florida, namely, *Gymnaspis aechmeae*, Newst., on Bromeliaceae; *Targionia sacchari*, Ckll., on sugar-cane; and *Lepidosaphes camelliae*, Hoke, on *Camellia japonica*.

Mukthi (B. K.). **The Lime Tree Borer.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore*, iv, no. 2, 1922, pp. 69–75.

A study of the lime-tree borer in the Bangalore district has shown one generation only in a year. The adult beetles emerge from the pupal chambers about the beginning of July and shortly afterwards eggs are laid on the surface of small, tender twigs. These hatch within a few days, and the larvae immediately begin to bore down the twig, making small holes at some distance apart for the purpose of admitting air and of emitting the powdery sawdust produced. The tunnels are mostly straight, but are not continuous from the twigs and branches right through the main stem; sometimes, after boring down, the grub tunnels transversely and then up the stem again, so that parallel tunnels often communicate with each other. The greatest number of tunnels found in a single stem of medium size was eleven. Different stages of the borers can be found simultaneously in one tree. When a grub in boring reaches the base of the stem it proceeds to tunnel in the main root and the thicker rootlets, but does not make much progress and frequently dies through lack of air and difficulty in obtaining food. The larval stage continues from mid-July or early August until the following May, when pupation generally begins.

The amount of damage depends largely on the age of the plant and the number of borers found in it. A well-grown tree can withstand the attacks of many borers; a young plant may die in about four months. No parasites have as yet been found, though the fact that the tunnel is left open behind the borer would facilitate the work of parasitisation.

For the destruction of the adults the leaves should be dusted with lead arsenate, especially during July and August. Adults on the wing should be caught with hand nets. Eggs can be destroyed when found on the surface of twigs or the petioles of leaves. The most efficacious practice, however, is to cut out young twigs as soon as they show any sign of infestation and to burn them. The method of injecting fluids, such as phenyle, kerosene or carbon bisulphide, into the tunnels by means of a small syringe has been tried, but is not recommended except as a last resource, as the grubs are very quick to turn away from the poison and escape into some other tunnel, which their mode

of burrowing easily enables them to do. A 25 per cent. solution of phenyle was fairly successful, but 50 per cent. damaged the plant; pure kerosene was effective; commercial carbon bisulphide destroyed the borers, but the plant was badly damaged; further experiments are being made to determine the maximum dosage non-injurious to the plant and the minimum dosage fatal to the grub.

SUBRAMANIA IYER (T. V.). **Notes on the More Important Insect Pests of Crops in the Mysore State.**—*Jl. Mysore Agric. & Exptl. Union, Bangalore,* iv, no. 2, 1922, pp. 78–81.

This section of notes on crop pests in Mysore [*R.A.E.*, A. x, 389] deals with Coccids, which are destructive to fruit-trees and permanent crops, such as coffee, tea or rubber. The most important are *Coccus viridis colemani*, Kann. (green bug), present on almost all coffee estates in Mysore, especially at the lower altitudes, being most abundant from March to May. Two fungi, a black form in summer and a white form in the cold season, keep the scale largely in check. Food-plants include guavas, *Citrus*, *Aegle marmelos* and *Ficus*. Spraying with fish-oil resin soap and the introduction of fungus enemies are practised. *Saissetia* (*Lecanium*) *hemisphaerica*, Targ. (brown bug) is present on most coffee estates, either on coffee or other plants, and sometimes constitutes a coffee pest. *Pulvinaria psidii*, Mask., attacks guava trees for preference, and is also found on coffee, *Ficus*, mango, *Citrus*, etc., covering infested trees with sooty mould. *P. maxima*, Green, is widely distributed, generally on margosa trees [*Melia azadirachta*], causing sooty mould, and encouraging large numbers of the black ant, *Camponotus compressus*. *Phenacoccus insolitus*, Green, is a pest of egg-plants [*Solanum melongena*] in September, the leaves of infested plants curling up. *Pseudococcus longispinus*, Targ., was noticed as a bad pest of mango trees in March. Three sprayings with kerosene emulsion reduced the numbers to normal. *Aspidiotus cydoniae*, Comst., is a pest of grapes, covering the vines so completely that they dry up. In the apple the scales cluster round the eye of the fruit and the fruit-stalks. *A. tamarindus*, Green, covers the fruits, leaves and small twigs of tamarind. *A. triglandulosus*, Green, is abundant on jak trees [*Artocarpus integrifolia*], the small twigs often being so densely covered that in a year they are quite dry.

BAUDYS (E.). **Zpráva o Vyskytnutí se Škůdců r. 1920.** [Pests of 1920.]—*Časopis Československ. společn. ent., Prague,* xviii, no. 3–4, 1921, pp. 55–58. [Received 29th July 1922.]

The pests recorded during 1920 in Czecho-Slovakia include: *Rhabdophaga saliciperda*, causing great damage to willows; *Contarinia ribis* on gooseberries; *Biorrhiza pallida* on oak; *Perrisia* (*Dasyneura*) *laricis* on larch; *Saperda populnea* on aspen and poplar; *Eriosoma* (*Schizoneura*) *ulmi* and *E.* (*S.*) *lanuginosum* on elm; *Sitona lineata* on beans, peas and lucerne; *Lema cyanella* causing serious damage to wheat in May; *Malacosoma neustria*, *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) and *Aporia crataegi* on fruit-trees; *Phyllocoptes vitis* in vineyards; the Aphids, *Myzus oxyacanthae* on apples and hawthorn. *M. cerasi* on cherries, *M. ribis* and *Aphis grossulariae* on gooseberries and red currants, *A. rumicis* (*euonymi*) on spindle tree, *A. pruni* on plums, *Pemphigus nidificus* on ash, *Eriosoma lanigerum* (*Myzoxylus laniger*) and *Chermes* (*Pineus*) *strobi*; *Tortrix viridana* on oak; *Typhlocyba*

rosae on rose; *Eulecanium* (*Lecanium*) *corni* on peaches, apricot and plum; *Eriophyes loewi* on lilac; *Tetranychus telarius* on lime; *Paratetranychus* (*T.*) *ununguis* on pine; *Sitodiplosis mosellana* (*Clinodiplosis aurantiaca*) on rye, wheat, oats and barley; *Contarinia onobrychidis* on flowers of sainfoin; *Rhyacionia* (*Retinia*) *buoliana*, injuring pine; *Scolytus pruni* on cherries and plum; *Xyloterus lineatus* in coniferous forests; the nun moth [*Liparis monacha*] on fruit-trees; *Haltica oleracea* and *Phyllotreta* (*H.*) *nemorum* on cabbage; *Pegomyia hyoscyami* (*Anthomyia conformis*) on *Brassica*; *Athalia spinarum* on mustard; *Tarsonemus spirifex* on oats; *Macrosiphum granarium* (*Siphonophora cerealis*) and *Chlorops taeniopus* on barley and wheat; *Oscinella* (*Oscinis*) *frit*; *Anisoplia austriaca* on wheat; *Melasoma* (*Lina*) *populi* on aspen and poplar; *Agelastica alni* on alder; *Phyllodecta* (*Chrysomela*) *vulgatissima* on willow; *Pteronus ribesii* (*Nematus ventricosus*) on gooseberries; *Brevicoryne* (*Aphis*) *brassicae* on cabbage; *Perrisia* (*Dasyneura*) *brassicae* on *Brassica*; *Ptinus fur* in stored flour; *Tortrix* (*Cacoecia*) *rosana* defoliating apples; *Apion assimile* on clover; *Bibio marci* in potatoes; and *Ceuthorrhynchus sulcicollis* on *Brassica*.

BEESON (C. F. C.). **Death of Chir in Almora.**—*Ind. Forester, Allahabad*, xlviii, no. 6, June 1922, pp. 342–343.

In commenting on a previous paper on the relative importance of fungi and insects in the death of young chir poles (*Pinus longifolia*) [*R.A.E.*, A, x, 389], the author agrees that the most important insects associated with the disease are *Cryptorrhynchus brandisi*, *Polygraphus* spp., and a bark caterpillar. Under *Polygraphus longifolia*, Steb., several species are included, the identity of which is doubtful owing to the confusion created in this genus by Stebbing's work. In trees killed by *Peridermium*, the author has seen *P. longifolia*, Steb., *P. himalayensis*, Steb., and new species of *Polygraphus* and *Carphoborus*, but not *P. major*, Steb., *P. niger*, Steb. (*aterrimus*, Stroh.), or *P. pini*, Steb. The evidence is now sufficient to show that the bark-borers of *Pinus longifolia* should be regarded as secondary pests under normal conditions, although under epidemic conditions certain species, such as *Ips longifolia*, Steb., may assume the status of primary ones assigned to them by Stebbing.

KURISAKI (M.). **Nihon san Nanahoshi-tentomushi Zoku ni tsuite.** [On the Genus *Coccinella* in Japan.]—*Dobutsugaku Zasshi* [*Zoological Magazine*], *Tokio*, xxxiv, no. 402, 1922, pp. 534–541, 6 figs.

Ten known species and three varieties of *Coccinella* are enumerated with short accounts of their morphological characters and the localities in which they occur.

KUWAYAMA (S.). **Ringo-hamakimodoki ni tsuite.** [Notes on the Apple and Thorn Skeletoniser in Hokkaido.]—*Hokkaido Nokaiho* [*Jl. Hokkaido Agric. Soc.*], *Sapporo*, xxii, no. 254–255, February–March 1922, pp. 1–14.

The small leaf-skeletoniser, *Hemerophila* (*Simaethis*) *pariana*, Clerck, has recently been found in apple orchards in Hokkaido and Aomori. The author has reared it and has studied the habits and the whole course of the life-history of this moth. There are three generations

a year in Sapporo. The imago has a habit of massing on flowers of cultivated chrysanthemums. The female oviposits in the groove of the petiole of the food-plant or sometimes on the upper surface of the leaf. Bordeaux mixture with potassium arsenite is recommended as a remedial measure.

KUWAYAMA (S.) & KAWAHARA (S.). **Karafuto ni okeru Matsukemushi Sangai Chosa.** [A Report on the Ravages of *Dendrolimus sibiricus* in Sakhalin Forests.]—*Hokkaido Ringyo Kaiho* [*Jl. Hokkaido Forestry Soc.*], *Sapporo*, xx, no. 229, 1922, pp. 1–44.

During the last few years the coniferous forests of Sakhalin have been attacked by *Dendrolimus sibiricus*, and serious damage was done by this moth in 1921. Data observed directly and gathered indirectly by the authors during the summer of that year are given. The causes of the rapid increase of the caterpillars are also discussed. The affected area in the forests in question up to the end of July 1921 was more than 86,000 acres. Of the trees attacked, the most seriously damaged were the two important species, *Abies sachalinensis* and *Picea ajanensis*, and these were completely defoliated.

In studying the climatic conditions during these years, it was found that in 1919–21 the temperature from April to August was markedly high and the amount of rainfall small as compared with 1918, when the damage was not conspicuous.

The Sakhalin jay feeds on the young caterpillars, and grouse eat the eggs in considerable numbers.

HAVILAND (M. D.). **On the Post-embryonic Development of certain Chalcids, Hyperparasites of Aphides, with Remarks on the Bionomics of Hymenopterous Parasites in General.**—*Qtrly. Jl. Micros. Sci., London*, lxvi, pt. 2, N.S. no. 262, June 1922, pp. 323–338, 7 figs.

The Pteromalids, *Asaphes vulgaris*, Wlk., *Pachycrepis clavata*, Wlk., and *Pachyneuron* sp., were obtained from cocoons of the Braconid, *Aphidius ervi*, Hal., a parasite of *Macrosiphum urticae*, Kalt. The development of the egg of *Pachyneuron* sp. was not observed. The eggs and early larval stages of the other two species are indistinguishable. Oviposition does not occur until the Aphid is dead and the *Aphidius* has woven its cocoon within the skin of the host. The eggs are deposited singly on the upper surface of the body of the *Aphidius* larva. Each individual may deposit from thirty to forty, and these hatch in about sixty hours. The host dies a day or two after the larva has begun to feed. Pupation occurs within the cocoon of the Braconid, and lasts from fourteen to sixteen days in the case of *Asaphes* and *Pachycrepis*; in the single case of *Pachyneuron* observed it only lasted ten days.

In confinement the adults lived from four to seven days, feeding on the sap from cut leaves and the honey-dew of Aphids. At least two generations a year may occur, depending probably on the number of hosts available. There is no evidence as to how these parasites pass the winter.

The adoption of revised terms to express the parasitic relations of such species [*R.A.E.*, A, x, 273] is suggested.

[HUTSON (J. C.).] **Pests on Tea and Coconuts.**—*Trop. Agric., Peradeniya,* lviii, no. 6, June 1922, pp. 375–376.

During the first quarter of 1922, *Helopeltis* was prevalent on several tea estates in the Southern Division of Ceylon. Lepidopterous pests include *Homona coffearia* (tea tortrix), *Heterusia cingala* (red slug), *Natada nararia* (fringed nettle-grub), *Acanthopsyche hypoleuca* (bag-worm) and *Chalia doubledayi* (faggot-worm). The large stem-boring and bark-eating caterpillar, *Phassus purpurascens,* was reported for the first time as a tea pest, on one estate only. It is quite likely that injuries attributed to other pests have been caused in some instances by the larva of this moth, which tunnels in the branches and eats away portions of the bark under cover of a webbed gallery covered with frass. A related species, *P. malabaricus*, bores into the roots of tea bushes in India. The small grey weevil, *Myllocerus curvicornis,* has been recorded as eating notches out of the edges of tea leaves. The tea mites, *Tenuipalpus obovatus* and *Tarsonemus translucens,* occurred on several estates.

Coconut pests included *Nephantis serinopa* (coconut caterpillar); and *Oryctes rhinoceros* and *Rhynchophorus ferrugineus* have been more than usually prevalent. Every attempt should be made to reduce the breeding-places of *O. rhinoceros* by burning all hollow and decaying palm stumps, fallen logs and dead palms, and by breaking up all heaps of decaying vegetable matter. These measures would also reduce the numbers of *R. ferrugineus,* which breeds mainly in palms already injured by *O. rhinoceros.*

BAERG (W. J.). **Eastern Strawberry Louse.**—*Arkansas Agric. Expt. Sta., Fayetteville,* Bull. 179, May 1922, 16 pp., 4 plates. [Received 1st August 1922.]

Myzus brevipilosus, sp. n. (eastern strawberry aphis), of which the stages are described, was at first thought to be identical with *M. fragaefolii,* Ckll., apparently the only other Aphid infesting the leaves of strawberry plants. The former occurs in north-west Arkansas, in the vicinity of Ithaca, N.Y., and probably in Illinois and other middle and eastern States; the latter is common in Arizona and California. During July and August the average length of the life of *M. brevipilosus* was about 30 days, the period from birth to the adult stage requiring about 11–15 days. The number of young produced by one female showed an average of 11, but in New York as many as 52 were produced. The Aphids only appear in large numbers at the beginning and end of the growing season, that is, in late March and April, and in November and December. Asexual reproduction continues all through the spring and summer, the numbers gradually becoming reduced through the activities of a predacious Reduviid bug. About mid-September winged individuals begin to appear, and these apparently migrate, though to what plant is not known. By November the winged forms decrease in numbers and the wingless ones increase. Parthenogenetic reproduction by wingless females continues through the winter, cold weather retarding the process to some extent. No sexual forms or eggs have been observed in Arkansas, but in New York eggs were found in November.

No appreciable damage has been observed due to *M. brevipilosus.* Should artificial remedies become necessary, hydrated lime and some form of finely powdered clay impregnated with nicotine sulphate would

probably give good results. As the greatest damage would be done in March and April, when remedies for the strawberry weevil [*Anthonomus signatus*] are applied, it would be of great advantage to devise a treatment that would be effective against both pests.

Work in Connexion with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Kitts-Nevis, 1920–21, Barbados,* 1922, pp. 10–12. [Received 2nd August 1922.]

Alabama argillacea was very abundant, particularly during the latter part of the season, though no very great damage was done, Paris green being extensively used against this moth. Cotton-stainers [*Dysdercus*] were slightly more abundant than during the previous year; and at the time of maturing of the cotton the leaf-blister mite [*Eriophyes gossypii,* Banks] was prevalent in the field, but little damage was done by it. Owing to the discovery of *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) [*R.A.E.*, A, ix, 99], Ordinance no. 12 of 1920 was passed fixing the close season for cotton in St. Kitts for February and ordering all cotton plants to be burned. Regulations were also made for the control of ginneries, fumigation and disinfection of seed for planting and the transport of seed for planting, and all bags and packages used therewith.

The legislation in force dealing with plant protection up to 31st March 1921 is quoted.

Molinas (E.). **Les Parasites du Rosier, le Ver du Rosier.**—*La Vie Agric. & Rur., Paris,* xxi, no. 30, 29th July 1922, pp. 75–76.

The Buprestid, *Coraebus rubi,* has been causing serious injury to roses in the south of France in the vicinity of Antibes. Eggs are probably laid at the bifurcation of the branches or on one-year-old stems.

Immediately after hatching the larvae penetrate the bark and begin their mines, of which they generally make first a descending and then a shorter ascending one. Pupation occurs at the summit of the ascending mine. In very thin stems the ascending mine may be made through the pith. Though only one larva is usually found in each plant, the damage it does is sufficient to cause death.

Remedial measures should aim at poisoning the adults by spraying the leaves on which they feed with 1 per cent. lead arsenate about the end of May, when they emerge. The same spray may serve to poison the larvae provided that the plant is well wetted. This treatment must be assisted by clean cultivation.

Box (H. E.). **The White Coffee Leaf-miner** (*Leucoptera coffeella,* **Stn.**).—*Farmers' Jl., Nairobi,* iv, no. 26, 29th June 1922, pp. 9–10, & no. 27, 6th July 1922, pp. 19–21, 3 figs.

Leucoptera coffeella, Stn. (white coffee leaf-miner) is present in Kenya Colony almost wherever coffee is grown, and, although not a pest of the first importance, it continually weakens the trees. The various stages of this moth are described, and the life-history and habits are discussed [*R.A.E.*, A, vi, 51, 104]. At Kabete, where the present studies were carried out, there are six generations; these are apparently continuous throughout the year, each occupying from 50 to 60 days. The remedial measures suggested are the collection of infested leaves when the larvae are abundant, and smoke fires from damp grass, etc., scattered about when the moths are numerous.

HIRST (S.). **Pseudoscorpions and Bees.**—*Bee World, Benson, Oxon.*, iv, no. 2, July 1922, pp. 36–37.

Referring to a recent account of *Chelifer cancroides* in beehives [*R.A.E.*, A, x, 448] the author quotes various records from which it is clear that either this species or *C. sculpturatus* frequents beehives in South and East Africa. Apparently there is no real parasitism, and insect hosts are used merely as a means of transport, the chief food being mites or minute insects. The introduction of these Arachnids into beehives is considered rather a dangerous experiment, as it might perhaps be harmful to the bees or their larvae.

In a note following this paper, R. Whyte questions the harmlessness of these pseudoscorpions among bees; at Cedara, in South Africa, although the eggs were not found in hives, they were twice found in the underground nests of wild colonies of bees, and the young Arachnids that hatched out, while refusing honey or pollen, sucked up the juices of bee larvae that had been injured in removing them from cells.

An editorial footnote suggests the advisability of scientific research on a permanent basis for the study of such bee problems as the economic status of pseudoscorpions. The records of *Chelifer* spp. being abundant in hives abroad, but not in Britain, seem rather in favour of their introduction.

GESCHWIND (A.). **Ein Beitrag zur Biologie der Panzer- oder weissrindigen Kiefer** (*Pinus leucodermis*, **Ant.**). [A Contribution to the Biology of *Pinus nigra leucodermis*.]—*Centralbl. f. d. ges. Forstwesen, Vienna*, xlvii, 1921, pp. 30–41. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart*, xxxii, no. 3–4, 1922, pp. 122–123.)

The caterpillar of *Dioryctria silvestrella* infests the cones of *Pinus nigra leucodermis* with the result that they are somewhat smaller and bent at the tip.

FULMEK (L.). **Blattläuse in Kleefeldern.** [Aphids in Clover Fields.]—*Wiener landw. Ztg.*, lxxi, 1921, p. 237. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart*, xxxii, no. 3–4, 1922, p. 151.)

In 1921 many clover fields near Vienna were badly injured by *Acyrthosiphon pisi*. This Aphid also attacked sainfoin and lucerne. The latter suffered most in mixed plantings with red clover. The measures adopted were rolling, in cases of less severe infestation, and the ploughing under of those portions that had been destroyed.

HERRMANN (F.). **Ueber die Lebensgewohnheiten und Entwicklung des Schlehenspinners,** *Orgyia antiqua*, **L.** [On the Habits and Development of the Sloe Moth, *Notolophus antiquus*.]—*Bericht d. höh. staatl. Lehranst. f. Obst- u. Gartenbau zu Proskau f. 1918–1919, Berlin*, 1921, pp. 92–95, illustrated. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart*, xxxii, no. 3–4, 1922, p. 158.)

Notolophus (*Orgyia*) *antiquus* hibernates in the egg stage only, and the first larvae appear early in May. The pupal period lasts 2–3 weeks. The female moth deposits 300–400 eggs, usually close to the place where pupation has occurred. The egg-masses should be burned. Spraying with arsenicals and other stomach-poisons should be carried out from May to December, but only if the infestation is severe.

HERRMANN (F.). **Beobachtungen über die Lebensweise und Entwicklung des Maikäfers,** *Melolontha vulgaris.* [Observations on the Habits and Development of *M. melolontha.*]—*Bericht d. höh. staatl. Lehranst. f. Obst- u. Gartenbau zu Proskau f. 1918–1919, Berlin,* 1921, pp. 95–98. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart,* xxxii, no. 3–4, 1922, p. 159.)

In the Proskau region *Melolontha melolontha* (*vulgaris*) requires four years for development. Lime trees, *Robinia* and *Ribes* are not attacked. Oviposition occurs in fields at points where the heavy loam changes to sand. The females appear to seek for the purpose the places where they emerged from the pupae. Statistics are given to show that birds cannot completely control these beetles though they may reduce infestation.

GERHARDT (K.). **Ueber die Entwicklung der Spirallockengalle von** *Pemphigus spirothecae* **an der Pyramidenpappel.** [The Development of the Spiral Curl-gall of *P. spirothecae* on the Lombardy Poplar.]—*Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart,* xxxii, no. 3–4, 1922, pp. 177–189.

The three phases that occur in the development of the galls of *Pemphigus spirothecae*, Pass., on the Lombardy poplar are the bending, twisting and swelling of the leaf-stalk. A slight bending was produced by scratching and wetting the wound with crushed individuals of this Aphid ; this effect was not obtained with another species (*Tetraneura ulmi*). The galls appear to produce very little injury.

WOLFF (M.). **Notizen zur Biologie, besonders auch zur Frage des Verbreitungsmodus von Eriophyiden (Gallmilben).** [Notes on the Biology, and especially on the Manner of Spread of Eriophyidae.]—*Zeitschr. f. Forst- u. Jagdwesen,* liii, 1921, pp. 162–173. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart,* xxxii, no. 3–4, 1922, p. 190.)

Eriophyes tristriatus, Nal., var. *erinea*, Nal., which produces galls on the walnut, can migrate in a few days from one tree to a neighbouring one. Neither heat nor sunshine impair the activity of this mite. Wind is not always responsible for its spread. Carriage by other insects is possible, and the author has found *E. tiliae liosoma* on the abdomens of cicadas.

PAOLI (G.). **Isolatori per difendere le Piante contro la Formica dell' Argentina.** [Protective Bands against the Argentine Ant.]—*Redia, Florence,* xv, 1922, pp. 73–77, 2 figs.

The Argentine ant, *Iridomyrmex humilis*, Mayr, was introduced into Madeira in 1886 or 1887 on sugar-cane from British Guiana. Besides the direct injury it does, this ant protects Aphids and Coccids from their enemies. In Italy, at San Remo and Rome, the dangerous scale, *Icerya purchasi*, is thus defended.

To prevent this, a method largely used in Madeira is advocated [*cf. R.A.E.*, A, vi, 181]. A strip of cotton wool is packed tightly round the stem of a tree and fastened with thread. Over this a band of tough paper is placed. This band consists of a strip about 3½ in. wide, with cuts about 1¾–2 in. deep and ⅛ in. apart made along one side. This results in a fringe. Two such bands are pasted together so that

the cuts in one fringe alternate with those in the other. The paper is wound five or six times round the cotton wool, the fringes being at the top edge. Rolls are then made of strips of cotton flannel, 97 in. long by about $\frac{4}{5}$ in. wide. From 60 to 64 of these are soaked in the following warm mixture: Water 2 litres, sea-salt 50 gm., mercury bichloride 500 gm., alcohol 50 gm. To prepare this the water and salt are heated, and when near boiling point the mercury bichloride is dissolved in it, and finally the alcohol is added. The strips are then unrolled and allowed to dry, and the operation is repeated in a similar solution, with perhaps a little less water. The strip is wound once (with the fluffy side outwards) round the paper band and tied on. The paper fringe is then pressed back so as to protect the poisoned strip from rain. In Madeira these bands are said to remain effective sometimes for as long as a year.

LEA (A. M.). **One Year's Food of an Owl near Adelaide.**—*Jl. Dept. Agric. South Australia, Adelaide,* xxv, no. 11, 15th June 1922, pp. 938–943, 4 figs.

An examination of one year's food of the Australian variety of the barn owl showed most of it to consist of the remains of sparrows, mice and other birds and small mammals. A small proportion consisted of insects, of which the chief species concerned were large night-flying moths and field crickets, *Gryllus servillei.* Other insects found were in most cases obviously from the stomachs of the birds eaten.

BALLARD (E.). **Tour of the Government Entomologist.**—*Planters' Chron., Coimbatore,* xvii, no. 28, 15th July 1922, pp. 408–413.

Pests of *Tephrosia candida,* which is being increasingly grown, include the Coccids, *Ceroplastodes* sp. and *Ceroplastes* sp.; these infest all the upper parts of the branches, encouraging sooty mould, and sometimes causing death of the branches. Infestation is always worse in open, unshaded areas. The simplest method of reducing damage is to cut the *Tephrosia* over as soon as heavy infestation is threatened. The monsoon generally reduces the numbers considerably. *Tephrosia* kept for seed is frequently damaged by an Anthribid beetle and by a caterpillar, both of which bore into the pod and devour the seed. If these pests occur the pods should be picked off and destroyed when the first crop of them is half ripe. The second crop should then be practically uninjured and should yield all the seed required.

The pests found on rubber trees are a species of *Lecanium,* occurring on the leaves, petioles and branches of *Hevea,* and causing considerable dropping of the foliage, and a red, flattened caterpillar that feeds under a web on the bark, generally from a height of about 3 ft. from the ground up to the lowest branches There are two, possibly three, generations in a year, the first beginning to appear in January. From May on to December they apparently leave the rubber trees, though individuals were still found in the bush. After feeding for about three weeks, the caterpillar pupates under a piece of bark in the web. The adult is a small white, black-spotted moth which emerges ten days later. The caterpillars do not feed on the latex, appearing to confine their attacks to the dead bark, but when they feed on the renewing bark or the tapping surface they are likely to be troublesome. In the latter case tar and tallow has been used with success; for the former the caterpillars should be scraped off the bark with stiff brushes.

Minor pests of tea include *Homona coffearia*, which could be greatly reduced if systematic plucking of the folded leaves were practised on all estates where it is numerous. *Thosea cervina* (slug caterpillar) sometimes causes defoliation of the bushes; the cocoons should be collected from the bases of the bushes and destroyed. A bagworm, *Arbela* sp., bores into the stem and feeds on the bark, but does not seem to do much damage. A mite, *Eriophyes* (*Phytoptus*) *carinatus*, was numerous on one estate, but was got rid of by deepening the drains. Many grasshoppers are present on tea estates. Those of the genus *Catantops* have been recorded as damaging young tea in new clearings. When troublesome they should be destroyed by using a poison bait made in the proportion of 1 oz. Paris green to 1 lb. rice bran, with 6 bananas and 1 teaspoonful of salt.

Helopeltis theivora is the chief pest of tea. The necessity for a serious study of this Capsid and of *Homona coffearia* is urged.

GOSSARD (H. A.) & WALTON (R. C.). **Dissemination of Fire Blight.** —*Ohio Agric. Expt. Sta., Wooster*, Bull. 357, March 1922, pp. 83–126, 14 figs. [Received 8th August 1922.]

It is a well-known fact that fire blight (*Bacillus amylovorus*) is disseminated by several species of sucking insects, and the spread of the disease can be largely prevented by killing off, early in the season, the Aphids, leafhoppers and other insects that carry it from tree to tree. Insects that have been definitely proved to be carriers include *Lygus pratensis* (tarnished plant bug), *Campylomma verbasci*, *Orthotylus flavosparsus*, *Ilnacora malina*, *Adelphocoris rapidus*, *Empoasca mali*, *Eriosoma lanigerum*, *Rhopalosiphum prunifolium*, *Anuraphis roseus* and *Aphis pomi*. There are also other classes of insect that have been known to disseminate the blight, such as *Scolytus rugulosus* (fruit-tree bark-beetle), *Rhynchaenus* (*Orchestes*) *pallicornis* (apple flea-weevil) and ants accompanying Aphids. Experiments to determine whether the bodies of *E. lanigerum* or the wax they deposit might be reservoirs for the organism of the disease during the winter, or whether the blight can survive the winter in the intestines of bees, all proved negative.

GOWDEY (C. C.). **The Resuscitation of Decadent Citrus Groves.**—*Jamica Dept. Agric., Kingston*, Ent. Circ., no. 7, 1922, 5 pp.

The most important pests of *Citrus* in Jamaica are Coccids and *Aleurocanthus woglumi* (black fly), which has been dealt with fully elsewhere [*R.A.E.*, A, ix, 543]. Of the 16 Coccids the most important are *Chionaspis citri* (orange snow scale), which attacks the trunks and larger branches, *Lepidosaphes beckii* (purple or mussel scale), found thickly encrusted on the branches, young twigs, leaves and fruit, and *Selenaspidus articulatus*, which attacks the foliage and fruit. The most efficient sprays against these scales are kerosene emulsion, lime-sulphur mixture, and Blackleaf 40.

HALL (W. J.). **Observations on the Coccidae of Egypt.**—*Egypt Minist. Agric., Cairo*, Tech. & Sci. Serv. Bull. 22, 1922, 54 pp., 3 plates.

The species of Coccids occurring in Egypt that are recorded in this paper number 56, but it is thought probable that over 100 may occur there. A short description is given of each, with a list of the

food-plants attacked, and, where the species concerned is known to be a definite pest, some notes are included on outbreaks and the measures taken to combat them. A list is given of the species dealt with according to the genera of plants attacked, and the legislation regarding Coccids in Egypt is quoted.

In an appendix eight Coccids found on *Citrus* spp. in the Jaffa district, and thirteen found on food-plants other than *Citrus* in Palestine are recorded. The former comprise :—*Chrysomphalus aurantii*, Mask., *Lepidosaphes beckii*, Newm., *Parlatoria pergandei*, Comst., *Ceroplastes floridensis*, Comst., *Saissetia oleae*, Bernard, *Coccus* (*Lecanium*) *hesperidum*, L., *Pseudococcus citri*, Risso, and *Icerya purchasi*, Mask.

FRIEDERICHS (K.) & DEMANDT (E.). **Weiteres über den indischen Nashornkäfer** (*Oryctes rhinoceros*, **L.**). [Further Information on the Indian Rhinoceros Beetle, *O. rhinoceros*.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 295–324, 5 figs., 3 plates.

In the author's monograph, published in 1919, on rhinoceros beetles as pests of the coconut palm [*R.A.E.*, A, viii, 275] it was not possible to give details of the method of attack by *Oryctes rhinoceros*, L., in Samoa, the records being still in that island. The injury is now described at length.

Palms of all ages from three months upwards are affected. Injury below the vegetative point or heart is comparatively rare and not directly dangerous, though it affords an entrance to other pests and to water. If much higher than the heart, it seldom extends to the latter, but should putrefaction ensue the heart-leaves may rot and the palm may die. Usually the attack occurs at the level of the heart or slightly above it, and this is very injurious. Direct injury to the heart is not necessary to kill the palm ; a large hole, bored through the inner leaf-bundle 12 or even 16 inches above the heart and permitting moisture and rot to penetrate, is quite sufficient to cause death. Owing to the above three sites of attack being found in Samoa and in the Far East, the rhinoceros beetle is more dangerous there than in Ceylon or than its related species in East Africa. In Ceylon (also perhaps in British India) and in East Africa, only the second form of attack (much higher than the heart) occurs, and the mine usually does not extend as far as the heart.

The authors have never observed more than one reproductive period in the female. In Samoa the crowns of injured palms do not become regular breeding-places. An examination of 500 felled palms in Vaitele, of which 5 per cent. were dead and all the remainder were severely injured, failed to reveal any eggs or larvae in the crowns. This is of great importance, as it might be assumed that dying as well as dead palms can contribute to the increase of the pest. Leefmans was the first to publish data on the length of the larval period. His results in Sumatra [*R.A.E.*, A, ix, 46] differ from those obtained in Samoa in 1916–17. The egg stage averages 11 days ; the larval stage, 304 ; the pupal stage, 20 ; and the resting period of the adult, 3 days. In the only two cases noted in Samoa 69 and 78 days elapsed between the emergence of the female and oviposition, so that a very lengthy life-cycle of about 411 days results. This does not agree with the rapid increase of *O. rhinoceros* in the early years after its introduction (1909–12), and it is noteworthy that in one out of twelve bred specimens development

required only about 193 days, with a larval period of 159. This specimen, in which the resting larval period was either very short or altogether absent, completed development at the end of the rainy season, while the eleven others did so before the beginning of the next rainy season, passing their resting larval period in the colder dry season. The time for the single specimen referred to above agrees to some extent with Leefmans' results, while that for the eleven others agrees with the period established for British India by Ghosh.

The results in Sumatra and Samoa are compared. Leefmans worked out a means of poisoning trap heaps with arsenic, and his method of preventing oviposition by means of a layer of sand eliminates most of the breeding-places (almost always rotting palm wood and rarely palm stumps) in the Dutch East Indies. In Samoa the position is quite different. Few or no species of trees are rejected for oviposition. Any tree stumps are likely to be infested, so that new fellings are a great danger to palms and the employment of sand is useless. In Sumatra the breeding-places are chosen near palms, so that the spread of the pest is limited. The same thing happens in Samoa, but palms there grow nearly everywhere, and the bush palm, *Cyphokentia samoensis*, is found in the forests near coconut plantations. In some parts, too, wind-carriage is an important factor. Consequently in Samoa *O. rhinoceros* has a much greater variety of breeding-places and is far more difficult to reach than in the Dutch East Indies. The authors accept Leefmans' view that driftwood affords a means of spread.

In Sumatra no use has been made of *Metarrhizium anisopliae*. The successful results in Samoa with this fungus were due to the intensification of an existing infection and not to the creation of one. About three months after a trap-heap has been established it is opened and all the adult beetles are destroyed. The larvae and eggs are mixed with fungus material, which is used at the rate of 10 dcm. per cubic metre of trap heap material [about 610 cu. in. per 35 cu. ft.], and are buried at the bottom of the heap, which is then remade. In a small heap 100 larvae are considered enough, and an excess of larvae from one heap is used to make up any deficiency in another. About six weeks afterwards the heap is examined and then closed up without removing anything. Three months later a third examination is made, and the fungus material is renewed if necessary. The author knows of no case where the infection has failed.

An investigation of the extent to which *O. rhinoceros* penetrates into virgin forest adjoining a coconut plantation showed that only the edges are involved, no trace of the beetle being found farther than about 40 yards. The case may be different in forests where many bush palms are growing. In 1916 the junior author noted that bush palms are attacked only after neighbouring coconut palms have been destroyed.

Data are given on the extent of infestation before the war and up to 1916. In the latter year the position was about the same as before. In newly-infested localities there was a large increase of injury, but in old-infested places no increase was noted. The devastating stage of the infestation was already over. Conditions in the first half of 1920 were roughly the same as in 1916.

Present measures are of an administrative character, such as collection and breeding-place elimination. The latter is perhaps done more thoroughly than in pre-war times, but this is outweighed by the entire discontinuance of biological measures. To reduce the infestation

within reasonable limits coconut cultivation must be centralised. Trap-heaps, collection, the removal of breeding-places, and possibly the introduction of natural enemies are the other measures advocated.

Fahringer (J.). **Beiträge zur Kenntnis der Lebensweise einiger Schmarotzerwespen unter besonderer Berücksichtigung ihrer Bedeutung für biolog. Bekämpfung von Schädlingen.** [Contributions to a Knowledge of the Habits of some Parasitic Hymenoptera with special regard to their Importance in the Biological Control of Injurious Insects.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 325-388.

The results of fifteen years' breeding experiments by the author and the late Dr. F. Tölg are given as regards 316 species of Hymenopterous parasites of Central or Southern European insects and Arachnids, including forest and agricultural pests. The species dealt with comprise 71 Ichneumonids, 2 Evaniids, 36 Braconids, 2 Proctotrupids and 3 Cynipids. Notes are given on the best methods for keeping and breeding such insects, with a list of 316 hosts and the parasites attacking them.

Thiem (H.). **Zur Biologie und Bekämpfung des gefurchten Dickmaulrüsslers** (*Otiorhynchus sulcatus*, **F.**). [A Contribution to the Biology and Control of *O. sulcatus*.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 389-402.

In Germany, *Otiorrhynchus sulcatus*, F., is, on occasions, a pest capable of considerable injury to grape-vines, berry fruits and greenhouse plants, following migration or introduction in earth, turf or humus. It has not been recognised as an important forest pest, but in the districts chiefly affected there is a well-grounded belief that the weevils migrate from oak forests to neighbouring vineyards. Though considerable, the recorded damage to *Taxus*, *Rhododendron*, *Camellia*, gooseberries and strawberries is slight compared with that to vineyards. In 1920, 4,000 out of 6,000 young grafted vines were destroyed at Berncastel-Cues. The roots are eaten, ringed or bitten through, and numerous grooves are gnawed on the stem to a height of 8-12 in. Eight-year-old vines have been destroyed ; old vines are not attacked, possibly on account of some chemical or mechanical change in their bark. The adults feed on the newly opened buds in early spring. Young berries and their stalks and shallow roots are also attacked by them. Both the weevils and their larvae will eat a great variety of plants with soft tissues. Stable manure, in which the larvae often occur, forms a source of food, and the abundant manuring often practised in attempting to save the vines by inducing vigorous growth is therefore not advisable. The slight importance of the larvae in forests may be due to the fact that they prefer humus to roots. Oak roots seem to be avoided.

The weevils that appear in early spring and in summer apparently become mature only in the following year, ovipositing in July and August (perhaps also in September) and again in spring after a second hibernation. Larvae hatched from the spring oviposition yield adults in July ; those from July eggs may perhaps hibernate as pupae, while later eggs yield hibernating larvae. The assumption of two annual generations is therefore incorrect. On feeling the warmth in spring the larvae at a depth work upwards to pupate. The appearance of

the adults also depends on warmth and the development of the vine. Compact soil that does not provide shelter is less favourable to *O. sulcatus* than loose soils, but the practice of applying compacted earth to the vines is useless and even disadvantageous, because the larvae utilise it to form pupal chambers impervious to fumigation. The migratory habits of the adult are very marked; they contribute materially to its spread and nullify such preventive measures as are based on starving out the insect before replanting. Vine foliage has been found to attract the adults, and may be used for trapping them. Soil fumigation may be employed in early spring and in autumn, all stages being then in the ground. Carbon bisulphide is largely used, but experimentally results with it were bad. Chloropicrin proved very effective, but seriously injures the vines. Toads and mites are natural enemies of little practical importance. A Tachinid parasite that has been bred from the larvae, and is believed to be *Pandelleia sexpunctata*, Pand., seems to be of greater value. Hibernated weevils are more highly parasitised than those emerging later in the year. None of the parasitised April specimens contained eggs, though eight non-parasitised ones did so. It is probable that such mature adults as were parasitised died prior to hibernation. From this it is concluded that in nature both young immature adults and old sexually mature adults can hibernate. Most of the Tachinid larvae in the April specimens had completed their second moult. The great majority of infested weevils contained only one parasite. Parasitised weevils are somewhat sluggish, and they die when the Tachinid larva is ready to pupate. Pupation requires about 14 days. The fly appears to have two annual generations. A saprophagous fly has been bred from the dead bodies of the weevils.

RHUMBLER (L.). **Der Mündener Binokelfuss; eine Vorrichtung zu Binokelbeobachtungen am stehenden Stamme.** [The Münden Stand for a Binocular Microscope, a Device for making Binocular Observations on a standing Trunk.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 403–412, 3 figs.

The apparatus here described consists of a foot, in the form of a triple claw, to which a binocular microscope removed from its ordinary stand can be readily secured. Each claw is fitted with a sharp-pointed steel pin, capable of being pressed into a wooden support. It is useful in the field for observing *in situ* such insects as scales or Aphids on a tree trunk.

WÜLKER (G.). **Die Parasiten und Feinde des grossen braunen Rüsselkäfers.** [The Parasites and Enemies of the large brown Weevil.] —*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 413–420.

Hylobius abietis, L., is an important pest of forest trees, especially spruce and pine, in Germany, Scotland, Sweden, Holland, Belgium and Russia, and large sums are expended in checking it by collection from bark and trap-logs. The possibility of biological and chemical control needs attention, and some observations on parasites and other enemies, made in the course of an investigation on *Allantonema mirabile*, Leucart, a Nematode parasitising *H. abietis*, are given here.

To understand the development of parasites an exact knowledge of that of their hosts is necessary, and this has not been available in the case of *H. abietis*. Besides a long larval period of 13-16

months this weevil can have a short one of 3–4 months; this has been described by Escherich, from the Bienwald, Rhine Palatinate [*R.A.E.*, A, ix, 156]. In the Bienwald, larvae hatch in about 10 days from eggs deposited in April–June by hibernated females in pine stumps from fellings during the winter. These larvae bore in the cortex and sapwood of the roots and are full-grown in 2–3 months. Some hibernate in the larval stage and yield adults after a pupal stage of 14 days in July in the following year. The others develop rapidly; they pupate in August and after 14 days yield adults that hibernate. Therefore eggs deposited in spring derive from eggs deposited either one or two years before. Furthermore, eggs in spring are also deposited by old individuals of the long-cycle (*i.e.*, those first hibernated as larvae) that have already oviposited in the preceding year. Escherich ascribes this variation in the length of the life-cycle to changes in temperature. The author suggests that the date of oviposition is an additional factor. Larvae hatched early (April) are most likely to transform into adults in the same year, while those hatched later probably hibernate before pupating. The author has never, however, noticed that larvae hatched in late summer require about 22 months (two hibernations) for development, as stated by Grohmann in Saxony [*R.A.E.*, A, ii, 326]. The temperatures in the various districts appear to influence development very markedly, and Grohmann does not appear to have found the short-cycle generation in his experiments. These points afford a partial explanation of the seemingly contradictory data on the length of development of *H. abietis*.

Of the Nematode parasites of the weevil, *Allantonema mirabile* has been closely investigated. Its reproduction seems to be an unbroken succession of autogamous hermaphrodites. It is the young weevil larvae that seem to acquire the infestation, which becomes less probable as the larvae penetrate deeper into the tree stumps. The effect of the infestation is negligible as regards natural control of *H. abietis*. Weevils harbouring numbers of adult and larval Nematodes did not appear to be in the least affected and, contrary to previous statements, retained their power of reproduction unimpaired.

As regards Hymenopterous parasites the author only once found some undetermined specimens in material comprising 800 adults and 400 larvae and pupae. F. Eckstein has found Syrphid larvae in the mines of the weevil [*R.A.E.*, A, viii, 406], and Grohmann has recorded a number of Arthropod enemies [A, ii, 326]. Of Protozoa, only *Gregarina hylobii* is known from *H. abietis*; it is harmless. Some birds feed on the adult weevils, but the larvae in the underground roots are well protected against them. Mechanical control, which usually satisfies the forester's requirements, is directed against the adults, unless the costly uprooting of stumps is resorted to.

DINGLER (M.). **Ueber Versuche mit Sprengungen zur Engerlingsbekämpfung.** [Experiments in Blasting as a Measure against Cockchafer Larvae.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 421–426, 3 figs.

Experiments in destroying the larvae of cockchafers [*Melolontha*] by blasting with explosives, used both alone and with the addition of poisons including chloropicrin, gave unsatisfactory results. This appears due to the depth (below the level where the larvae occur) at which it was necessary to lay the charges in order that their effect should not be

uselessly expended in the air. A useful result would be attainable only with charges that act chiefly in a horizontal plane and that are placed at a very slight depth. The addition of gaseous poisons is useless, because, apart from the resistance of the larvae, the earth is very impermeable, especially where it has been compressed by an explosion.

STELLWAAG (F.). **Arsenmittel, Weinbau und Pflanzenschutz.** [Arsenicals, Viticulture and Plant Protection.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 427–436, 4 figs.

The vine-louse [*Phylloxera*] was first noticed in Germany in 1874, and 40 years later, scarcely 1 per cent. of the German vineyard area was infested, the cost of the measures taken against it during the whole period being about £1,300,000 at par. An equivalent sum was lost in one year (1910) as a result of infestation by vine-moths (*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.), which constitute an immense danger that can be, however, combated effectively by means of arsenical sprays.

Up to 1900 *C. ambiguella* was the species chiefly involved, and the measures adopted were without any scientific basis, just as they had been during the preceding two thousand years. About 1900, new measures based on investigations on the life-history of the moth began to be applied. *P. botrana*, first noticed as a vine pest in Germany in 1899 by Zschokke, began to become important. This moth has a third, autumn generation, a shorter development period and no well defined flight periods, so that it is more difficult to deal with than *C. ambiguella*. Nicotine sprays proved very useful against these vine-moths. Arsenicals were tested in 1907 with fair results, but administrative regulations made their employment impossible. By 1915 nicotine was proved to be effective against both the spring and summer generations of the vine-moths, but by 1917 tobacco products were too costly and almost unobtainable, and it became necessary to find a cheap and effective insecticide and to use it universally if the vineyards were to be saved. Arsenicals, the cost of which is only a small fraction of that of nicotine, can be incorporated in the lime-copper spray used against *Peronospora* and satisfy all requirements; in 1921 in the Palatinate alone they were used on a area more than ten times as large as in 1918. The German Ministry of Health has modified its regulations respecting arsenicals to meet the new conditions.

LINDINGER (L.). **Zur Reblausfrage. Eine Entgegnung an Herrn Börner.** [On the Vine-louse Question. A Reply to Herr Börner.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 437–444.

Börner's criticism [*R.A.E.*, A, ix, 609] of the author's view that the original habitat of the vine-louse [*Phylloxera vastatrix*] is the shores of the Black Sea [*R.A.E.*, A, ix, 256] is discussed.

WIMMER (—). **Ueber das Vorkommen der Knopperngallwespe** (*Cynips calicis*, **Burgsd.) in Deutschland.** [The Occurrence of *C. calicis* in Germany.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 445–447.

Cynips calicis, Burgsd., is well known as the producer of galls on the pedunculate oak (*Quercus pedunculata*). These are particularly rich in tannin, and are collected in large quantities in the oak forests of Croatia and Slavonia.

Various scattered notices of the sporadic occurrence of this gall insect in Germany are here collected. The author's own observations show that the galls are numerous where the turkey oak (*Q. cerris*) occurs together with *Q. pedunculata*. This supports Beyerink's statement that *C. calicis* can complete its life-cycle only when these two oaks occur near one another.

WOLFF (M.) & KRAUSSE (A.). **Zur Schreibung von biologischen Formeln.** [The Writing of Biological Formulae.]—*Zeitschr. angew. Ent., Berlin,* viii, no. 2, May 1922, pp. 447–451.

The authors explain the principles followed in their method of writing formulae representing the life-history of insects; this is considered somewhat easier to read than the system worked out by Rhumbler [*R.A.E.*, A, viii, 269], which has been modified by Börner [*R.A.E.*, A, ix, 547] and by Prell [*R.A.E.*, A, ix, 610].

SCHUBERT (W.). **Die Rübenwanze,** *Piesma capitata,* **Wolff.** [The Beet Bug, *P. capitata.*]—*Zeitschr. angew. Ent., Berlin,* viii, no. 2, May 1922, pp. 451–452.

Since about 1903 beet in Silesia and the whole of Eastern Germany has been affected by a curl disease, previously unknown, due to a Tingid bug, *Piesma capitata,* Wolff. The damage is so serious that, particularly in 1910, some beet-growers contemplated giving up this crop. The infestation must be due to a migration from wild plants to the more attractive cultivated crop. The adult and the larva suck all the aerial parts of the plant, especially the undersides of the leaves. The adults are very sensitive to jarring, and the vibration caused by footsteps sometimes suffices to make them drop to the ground, where their grey-black colour renders them almost invisible. The injury at first resembles the curl due to Aphids; yellow spots then appear, the leaves rot, the beet top becomes conical, and the roots remain of small size.

The hibernated generation oviposits at the end of April or early in May, and the resulting individuals oviposit at the end of June or early in July. This generation is full-grown by the end of August and is the one that hibernates. The eggs are laid on leaves and leaf-stems. Incubation requires 10 days. The larva moults five days after hatching and twice again at five-day intervals. A description of the larva and adult is given. *P. capitata* is most harmful in June and July, and hot, dry weather seems very favourable to its development. Up to now neither insecticides nor trap belts of potatoes round a field have proved of use.

DINGLER (M.). **Feinde des Engerlings unter den Wirbeltieren.** [Vertebrate Enemies of the Cockchafer Larva.]—*Zeitschr. angew. Ent., Berlin,* viii, no. 2, May 1922, pp. 455–456.

A number of observations by different workers show that rooks, starlings and blackbirds destroy large numbers of cockchafer larvae [*Melolontha*]. The mole does not seem to be of importance in this respect.

BRASSLER (K.). *Melasoma (Microdera) vigintipunctata*, **Lin.**—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, p. 457.

The continued dry, hot weather in 1921 in Bavaria resulted in the occurrence of great numbers of the Chrysomelid, *Melasoma vigintipunctata*, L. In one district this normally harmless beetle not only attacked its usual food-plants, *Salix alba* and other willows, but also other foliage trees, which it almost defoliated.

VON LENGERKEN (H.). *Sitodrepa panicea* **als Lederschädling.** [*S. panicea* as a Pest of Leather.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, p. 458.

Referring to a record of *Sitodrepa panicea* boring into those parts of a leather trunk where paste had been used [*R.A.E.*, A, x, 145], a similar case is described, where the leather itself was eaten.

VON BERLEPSCH (—). **Waldschutz durch Vogelschutz.** [Forest Protection by Bird Protection.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, p. 460.

In a previous notice the value of birds was illustrated by the immunity of a forest from severe infestation by *Dasychira pudibunda* [*R.A.E.*, A, x, 257]. The author, whose arrangements for bird protection were believed to be responsible for this result, reports that the immunity has continued in the past season under conditions proving conclusively that birds were the chief factor in preventing the defoliation seen in the surrounding forests.

LEHMANN (H.). **Deutsche Arbeiten über die Insekten des Weinbaues und deren Bekämpfung vom Frühjahr 1917 bis 31 Dezember 1920.** [German Papers on Viticultural Pests and their Control published from the Spring of 1917 up to 31st December 1920.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 460–476.

The subject-matter of this review is indicated by its title. Many of the original papers have already been noticed.

FEYTAUD (J.). **La Cité des Termites. Moeurs sociales du Termite lucifuge. Ses Ravages—sa Destruction.**—*Paris*, L. Lhomme, 1921, 135 pp., 10 figs. Price 3 francs.

An interesting account is given of the bionomics of termites in general, and of *Leucotermes lucifugus*, Rossi, in particular. *L. lucifugus* is now a common and dangerous pest of constructional timber in some towns of western and south-western France. In cases where the use of timber is unavoidable in building, its impregnation with suitable substances and proper constructional methods are important factors in preventing infestation. Among the various measures against this pest, fumigation is strongly advocated, and the author has obtained success with chloropicrin in a house that was badly infested, by spraying the liquid at the rate of 15 gm. (about ½ oz.) per cubic metre (about 35 cu. ft.). The rooms were kept closed for 16 hours, and this time sufficed to kill the termites within the beams.

Straňák (F.). **Příspěvek k poznání fytopathologiského významu třásněnek.** [A Contribution to a Knowledge of the phyto-pathological Importance of Thrips.]—*Zemědělský Archiv, Prague*, 1920, pp. 1–5, figs. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 2, p. 7.)

In Czecho-Slovakia the spread and abundance of thrips increases when the conditions are unfavourable to the cereals concerned. The injury is less when cereals are grown after leguminous crops. Early-sown cereals suffer particularly. Rye is the most affected (25–100 per cent.), wheat (5–70) and barley less (5–40), and oats much less. *Haplothrips* (*Anthothrips*) *aculeatus* is the chief species on rye, which is also infested by *Limothrips denticornis* and *Aptinothrips rufus*. *Stenothrips graminum* is the most common on wheat, *H. aculeatus* and *L. denticornis* being less frequent. *L. denticornis* is the principal species on barley, on which *Aeolothrips fasciatus* and *S. graminum* also occur. Oats are attacked by *S. graminum* and *L. denticornis*, seldom by *Dictyothrips betae* and *Bolacothrips*.

The damage done by thrips is more serious than is generally recognised. Even the apparently sound spikelets are weakened in an infested ear of rye. The lower ones are those usually destroyed, and the upper ones are deprived of support and the ear breaks.

Morgenthaler (O.). **Eine Gallenbildung an Haselkätzchen.** [A Gall Formation on the Catkins of the Hazel.]—*Mitt. Naturf. Ges. Bern*, 1920, p. 48. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 3, p. 5.)

The gall-midge, *Diplosis corylina*, Lw., produces galls in the catkins of hazel, and the mite, *Eriophyes avellanae*, causes galls in the buds.

Israël (W.). **Dendrologische Notizen. Schädlinge an Maulbeerbäumen.** —*Mitt. Deutschen Dendrolog. Ges., 1920*, 1921, p. 301. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 3, p. 6.)

In Serbia mulberries are attacked by Bostrychid larvae, by a leaf-spinning species of *Hyponomeuta*, and by the caterpillars of *Acronycta aceris* and *Smerinthus tiliae*. In Germany the author has noticed the caterpillar of *Cossus cossus* inside the stem and roots of mulberry.

Krausse (A.). **Notiz über den Gabelschwanz,** *Dicranura vinula*, **L., und einen seiner Parasiten,** *Apanteles vinulae*, **Bouché.** [A Note on *D. vinula* and one of its Parasites, *A. vinulae*.]—*Zeitschr. f. Forst- u. Jagdwesen*, liv, 1922, pp. 25–28, 1 fig. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 3, p. 9.)

The larva of *Dicranura vinula*, L., lives on poplars and willows. Its parasite, *Apanteles vinulae*, Bch., is not synonymous with *A. affinis*, Nees.

Kaven (—). **Tierische Schädlinge an Himbeeren.** [Animal Pests of Raspberries.]—*Förderer im Obst- u. Gartenbau*, 1920, no. 25, p. 1. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes, Vienna*, 1922, no. 3, p. 9.)

Raspberry shoots may be recognised to be infested by *Incurvaria* (*Lampronia*) *rubiella* by their withered appearance, and they must be

cut off and destroyed. Against the raspberry borer [*Pennisetia hylaeiformis*] the collection in July of the pupae in the canes of the previous year is advised. Collection of the buds infested by the raspberry weevil [*Anthonomus rubi*] and of the weevil itself is the only available measure. As the larvae of another weevil, *Polydrosus calcaratus*, live in the ground, the latter should be dug up and well limed in winter; the beetles may be jarred off in the morning, this being also the only remedy against the raspberry beetle (*Byturus*).

RÖRIG (G.). **Vogelschutz.** [Bird Protection.]—*Biol. Reichsanst. f. Land- u. Forstw., Berlin*, Flugblatt 67, June 1922, 4 pp., 1 fig.

This circular deals with the value and practical possibilities of bird protection in Germany as a means of checking injurious insects.

SACHTLEBEN (H.). **Gegen den Maulwurfsfang.** [Against Mole Catching.] —*Nachrichtenbl. deutsch. Pflanzenschutzdienst, Berlin*, ii, no. 7, 1st July 1922, p. 53.

In view of the rise in price of mole skins the Imperial German Biological Institute has drawn attention to the services rendered by the mole, which include the destruction of many injurious insects. Further investigations on its food are being made. A law was passed in Bavaria in 1920 forbidding the destruction of moles except in enclosed gardens.

EXT (—). **Das Auftreten der Rübenblattwanze in Anhalt.** [The Occurrence of the Beet Leaf Bug in Anhalt.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst, Berlin*, ii, no. 7, 1st July 1922, p. 54.

A devastating outbreak of the beet leaf bug [? *Piesma capitata*, Wolff] is reported from many parts of Anhalt, fodder and sugar-beet being severely attacked. The eggs are laid at the end of May, usually on the undersides of the leaves of beet seedlings. In seven to fourteen days the larvae appear, and develop into adults in one month or six weeks. Measures are not practicable against the adults, which hibernate in woods, bushes, meadows and grass edges. Beet should not be grown near these winter quarters, and must be drilled as late as possible, never before mid-May. Stable manure should not be used after the preceding autumn, and it must be ploughed in deep. Powdered quicklime should be scattered in spring in the beet fields, which should be rolled as long as the young plants are able to survive the process, as this crushes the soft eggs and very young larvae. Quicklime may be used when the plants are growing, but must not be allowed to touch them. A recurrence of this outbreak is expected in 1923.

WILKE (—). **Ein neuer Schädiger der Zuckerrübenfelder.** [A new Pest of Sugar-beet Fields.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst, Berlin*, ii, no. 7, 1st July 1922, p. 56.

Tanymecus palliatus, F., has begun to attack the foliage of sugar-beet in Pomerania. This weevil normally lives on nettles. It is, however, a recognised pest of sugar-beet in Hungary and parts of Russia.

BÖRNER (—) & JANISCH (—). **Zur Lebensgeschichte und Bekämpfung der "Schwarzen Blattläuse."** [A Contribution to the Life-history and Control of the "Black Aphids."]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst, Berlin,* ii, no. 8, 1st August 1922, pp. 65–67.

As a result of his previous investigations [*R.A.E.*, A, x, 262] the senior author treated as distinct species the following black Aphids: *Aphis viburni* on snowball, *A. philadelphi* on *Philadelphus*, and *A. rumicis* on *Rumex*, while the name *A. euonymi* was used for Aphids on *Euonymus*. The varying behaviour of the last-named when transferred to herbaceous plants indicated the possibility of further differentiation among them which this year's work has confirmed. During the spring of 1922 black Aphids on *Euonymus* from various sources were bred for comparison. It was found that they are divisible into two species, differentiated by the length of the hairs (especially on the antennae, fore-legs and sides of the body) and by the food-plants. The short-haired species refused *Vicia faba, Chenopodium, Beta* and *Papaver*; these were accepted by the long-haired species, for which the name *A. papaveris* is adopted, the short-haired one being called *A. euonymi*.

A. papaveris occurs in spring and autumn on *Euonymus*, on which alone it hibernates, and in summer and early autumn it is found on the plants mentioned above and on *Cirsium, Carduus, Fumaria, Urtica dioica, Phaseolus*, Umbelliferae, *Campanula, Capsella, Rheum, Galium*, and *Scorzonera*. It also occurs on the young shoots of some woody plants, such as grape-vine, *Crataegus, Pyrus* and *Cydonia*. In the open it has never been seen on *Rumex* and cannot be bred on it. It also refuses *Arctium lappa* and *Solanum nigrum*. It is especially injurious on *Vicia faba, Beta, Chenopodium, Papaver* and *Phaseolus*, and curls the leaves of *Euonymus, Beta, Chenopodium*, stinging nettle, etc.

A. euonymi occurs in spring and autumn on *Euonymus*, on which alone it hibernates. In summer and early autumn it is found on *Solanum nigrum, Polygonum convolvulus*, common thistle, *Rumex crispus* and Umbelliferae, causing leaf-curl on them. It is not injurious.

There is a third migratory black Aphid, the autumn, winged individuals of which van der Goot incorrectly described as the alate forms of the snowball Aphid, *A. viburni*. Breeding experiments, begun in autumn 1921 with the winged migrants to the common snowball, resulted in large colonies infesting the ends of the shoots and lower surfaces of the leaves without causing any leaf-curl as *A. viburni* does. Attempts to transfer the spring forms to *Vicia faba, Chenopodium, Beta* and *Papaver* failed. Transference to *Arctium lappa* succeeded very well; success was less marked with *Rumex* and Umbelliferae. No leaf-curl was produced on these summer food-plants. This last fact and the above limitation to certain plants are biological differences that in conjunction with a morphological difference (the presence of secondary olfactory organs on the fifth antennal joint of the sexupara) justify in the author's view the erection of a new species, *A. mordwilkoi*. It is not injurious, and it hibernates on snowball alone. It is long-haired, like *A. papaveris*.

A. viburni is not a true migratory Aphid. It occurs from spring to autumn on the common snowball, on which it causes leaf-curl and to which alone it is injurious. It hibernates on this plant alone. Transmission to herbaceous plants has succeeded artificially only. It has very long hairs.

A. philadelphi occurs from spring to autumn on *Philadelphus*, causing leaf-curl. It has been transferred to herbaceous plants artificially only. It is injurious only to *Philadelphus*, and hibernates on this plant alone. It is long-haired, like *A. papaveris*.

A. hederae occurs from spring to autumn on ivy, causing a slight leaf-curl, and hibernates on this plant. No other food-plants are known. The hairs are somewhat longer than those of *A. euonymi*.

A. ilicis occurs in summer on holly (*Ilex*), causing leaf-curl. The authors have not yet ascertained if this is a distinct species.

Another non-migratory black Aphid may prove to be *A. podagrariae*, Schrank, unknown since 1801. It occurs from spring to autumn on *Aegopodium podagraria*, causing marked leaf-curl. It hibernates on this plant. It is not injurious. Biologically it is close to *A. rumicis*, but resembles *A. viburni* in being long-haired.

A. rumicis occurs from spring to autumn on *Rumex*, causing a marked leaf-curl. It hibernates on this plant. No other food-plants are known. It is not injurious. The hairs are slightly longer than in *A. euonymi*.

In combating the black Aphids, a knowledge of the winter food-plants is very valuable, though this has been discounted hitherto owing to the view that nearly all the species mentioned above were identical, so that *A. papaveris* was believed to have as winter hosts not only various shrubs, but also wild *Rumex*. It is here shown that only *A. papaveris* (in the limited degree accepted in this paper) is a pest of beans, beets and other useful plants. Its sole winter hosts are the various wild or cultivated species of *Euonymus*. If, therefore, all these plants could be treated in winter, or all the eggs on them could be destroyed in autumn and winter, complete control of the bean and beet Aphids would result. This measure would have to be undertaken in winter not only in Germany, but throughout a large region in Europe, a fact that renders it a remote possibility at present. There does not seem to be any other imaginable method against *A. papaveris* that is of economic value and rests on a scientific basis. In any case, however, the results of these investigations may be applied by large agricultural undertakings by dealing with *Euonymus* growing in beet areas. It is certain that *A. papaveris* is less common in districts where *Euonymus* is absent. On the other hand, the snowball may be disregarded as an alternative food-plant, as well as *Philadelphus* (mock orange), holly, *Rumex* and *Aegopodium podagraria*.

FRIEDERICHS (K.). **De Bestrijding van de Koffiebessenboeboek op de Onderneming Karang Redjo.** [Measures against the Coffee-berry Borer on the Karang Redjo Estate.]—*Meded. van h. Koffiebessenboeboek-Fonds, Soerabaya*, no. 1, February 1922, 21 pp.

The coffee-berry borer, *Stephanoderes hampei*, Ferr., was noticed in West Java in 1909; nine years later it had spread throughout Java and threatened to become a pest in other parts of the Dutch East Indies. A fund for combating it was established in July 1921, and the author was entrusted with the study of this beetle. Complete success has attended energetic measures on one estate. The method adopted was that of "rampassen" advised by Leefmans [*cf.* also *R.A.E.*, A, i, 57]. After the crop had been picked, not only were all the ripe berries removed, but also all the young berries of more than 5 millimetres ($\frac{1}{5}$ in.) diameter. This was done in September or October 1921. Ripe berries only appear again after mid-January,

and as the beetle cannot breed in unripe berries its reproduction is interrupted for several months. This procedure is usually supplemented by the collection of all the over-ripe berries that have fallen to the ground. In this case such fallen berries were not worth collection, and they were rendered harmless by slightly digging over the whole ground, a procedure that buried and soon rotted them. As the soil under the bushes could not be dug, it was covered with a layer of earth. Beetles from these buried berries, however, emerged and did much injury by boring into the young berries or the bases of their stems, thus causing considerable damage to the new crop, though the beetle could not breed in them.

A fungus, *Botrytis* sp., was noticed in September 1921, and spread to such an extent that in mid-November large numbers of dead beetles, covered with the white fungus, were seen on the bushes. By the end of the year the plantation was free from infestation. Whereas at the end of the harvest in September about 85 per cent. of the berries were infested, in mid-January 1922 only 0·2 per cent. contained living beetles. Neighbouring estates that had not adopted these measures remained severely infested. For this reason the author believes that while the fungus epidemic was quite a natural one, its extraordinary increase and spread were favoured by the " rampassen " method, and by the burying in the soil of the fallen, blackened coffee berries. The fungus was also favoured by the prevalent rains and by the fact that the coffee plantation was a very shady one. The infection extended to adjoining estates only to a slight extent.

[N.B.—In this and the following abstracts of papers by Dr. Friederichs use has been made of some MS. notes on these papers received direct from the author, which contain some information that is not found in the Dutch originals.—*Ed.*]

FRIEDERICHS (K.). **Verslag van den Entomoloog over het Tijdvak 1 Augustus 1921 t/m 31 December 1921.** [Entomologist's Report from 1st August 1921 to 31st December 1921.]—*Meded. van h. Koffiebessenboeboek-Fonds, Soerabaya*, no. 2, June 1922, pp. 21–26.

Stephanoderes hampei, Ferr., is not affected by stomach poisons because it bores into the berry without feeding; and its body is well protected against contact poisons. Van Davelaar and Hallauer have recommended a mixture [of 6 parts axle grease and 1 part petroleum] as an asphyxiating compound to be brushed thinly on the berries. If this mixture comes in contact with the berry stems, the berries die and fall off, but this does not occur with a careful application of a coat not thick enough to run. The author believes that this method may be valuable if applied to all young berries during the rainy season, between two harvests, and on all the bushes in a plantation. It is, of course, necessary that all the ripe berries must have been harvested and all blackened berries on the ground must have been removed. The plantation will thus become uninhabitable for *S. hampei*.

Much attention has been given to a fungus infesting this beetle; the results will be published later. This fungus attacks other insects also. *Metarrhizium anisopliae* has also proved virulent to *S. hampei*. The fungus under investigation seems more common on hybrids and on varieties of Liberia coffee. This and other observations seem to indicate that *S. hampei* is less injurious to Liberia coffee than to *Coffea robusta*. Varieties of coffee that have berries with hard envelopes are stated to be less liable to injury.

FRIEDERICHS (K.). **Korte Samenvatting der Bestrijdingsmaatregelen tegen den Koffiebessenboeboek** (*Stephanoderes hampei*, **Ferr.**). [A Short Résumé of the Measures against the Coffee-berry Borer, *S. hampei*.]—*Meded. van h. Koffiebessenboeboek-Fonds, Soerabaya*, no. 2, June 1922, pp. 27–36.

In cases of severe infestation "rampassen" [see above] must be carefully carried out after the harvest has been picked and before mid-October. All fallen berries must be buried so that they rot rapidly; this may be done by digging them under or by collecting and then burying them, which must be completed not later than mid-November. When ripe berries again invite attack in January they must be plucked. Bored berries should be thrown into a 5 per cent. solution of creolin, and the harvested berries taken to the factory in bags of a texture that precludes the escape of any beetles. They can be killed at the factory by keeping the berries under water for five days.

In the case of slightly infested plantations, infested berries, both ripe and unripe, should be collected throughout the year, or the unripe berries may be brushed with petroleum, a fine brush being used to convey the petroleum to the bore hole and thus kill the beetle. To encourage the parasitic fungus the plantation must be well shaded at the beginning of the rainy season.

Plantations that are not infested should not acquire coffee seed from attacked estates. The implements used in harvesting serve to spread infestation and should be cleansed by immersion in boiling water. If the coffee bushes are kept dwarf by pruning and are not too close together, the above measures, as well as harvesting, will be facilitated.

FRIEDERICHS (K.). **Voorschrift voor eene Statistiek over de Boeboek-Aantasting op de Koffieondernemingen.** [A Plan for Statistics on Beetle Infestation on a Coffee Estate.]—*Meded. van h. Koffiebessenboeboek-Fonds, Soerabaya*, no. 2, June 1922, pp. 37–42.

Statistics on the extent of infestation are needed to ascertain the effect of the measures employed. The method outlined in this paper is specially planned for conditions in Java in reference to *Stephanoderes hampei*.

VAN POETEREN (N.). **Verslag over de Werkzaamheden van den Plantenziektenkundigen Dienst in de Jaren 1920 en 1921.** [Report on the Work of the Phytopathological Service in the Years 1920 and 1921.]—*Verslagen en Meded. Plantenziekten-Dienst, Wageningen*, no. 27, July 1922, 92 pp., 2 plates.

In an infestation of plums by *Magdalinus pruni*, L., tits were seen pecking the larvae out of the dead branches. A sawfly, *Hoplocampa fulvicornis*, also occurred on plums. *Incurvaria capitella* and *Aegeria* (*Sesia*) *tipuliformis* infested red currants. A Nematode infesting strawberries was identified as *Aphelenchus ormerodis*, Ritz. Bos, by Dr. de Man, who expressed a doubt whether this was not identical with *A. modestus*, de Man, repeatedly found living free in the ground. A grasshopper, *Tachycines asynamorus*, Adel., was found in a greenhouse.

Chermes pini infested *Pinus sylvestris*, *P. excelsa* and *P. orientalis*. This Aphid chiefly reproduces parthenogenetically on *P. sylvestris*; in this case the generations living on the intermediate host, *P. orientalis*, including the sexuales, are entirely cut out.

Haltica erucae, the oak flea-beetle, defoliated climbing roses in a garden surrounded by tall trees, including oaks, and also slightly infested strawberries. *Otiorrhynchus picipes* severely attacked apple graftings in one locality, and serious injury to pear foliage by *Psylla pyri* was recorded. Peach leaf-rolling caterpillars that had done much harm proved to be those of *Tortrix* (*Cacoecia*) *rosana*.

A bug, *Halticus saltator*, did considerable injury to cucumbers, and two mites, *Tetranychus* sp. and a species of *Tarsonemus* near *T. kirchneri*, Kram., injured the leaves of heliotrope. Two thrips new to Holland—apparently *Taeniothrips orchidii*, Moult., and *Scirtothrips longipennis*, Bagn.—occurred on *Amarantus* in a hot-house. The caterpillars of *Gracilaria zachrysa* (*azaleella*) almost completely defoliated a number of plants of *Azalea indica*.

Da Costa Lima (—). **Sobre o Scolyto Destruidor dos Cafesaes.** [On the Scolytid Destroyer of Coffee Plantations.]—*Chacaras e Quintaes, S. Paulo*, xxvi, no. 1, 15th July 1922, pp. 34–35.

In view of the ravages abroad of the coffee-berry borer, *Stephanoderes hampei*, Ferr., the Brazilian Ministry of Agriculture on the 14th January 1922 prohibited the importation of coffee seed into Brazil.

Brèthes (J.). **Himenópteros y Dípteros de varias Procedencias.** [Hymenoptera and Diptera from various Sources.]—Reprint, 30 pp., dated 1922, from *Anales Soc. Cientifica Argentina*, xciii, pp. 119 *et sqq*.

The new species described include a Cecidomyiid, *Neurolasioptera baezi*, gen. n., producing galls on the stems and terminal shoots of *Teucrium inflatum*.

Among the Hymenoptera are a Proctotrupid, *Synopeas neurolasiopterae*, parasitising *Neurolasioptera baezi*; the Chalcids, *Eudecatoma paranensis*, also a parasite of *N. baezi*, *Pseudooderella catamarcensis*, gen. n., parasitising a Syrphid pupa on *Opuntia sulphurea*, *Cerapterocerus bonariensis*, parasitising *Ceroplastes bergi*, Ckll., and *Prodecatoma parodii*, producing galls on the branches of *Prosopis alba*; an Ichneumonid, *Balcarcia bergi*, gen. n., parasitising *Oeceticus geyeri*, Berg; and the Braconids, *Apanteles duplicatus* and *Catolestes argentinus*, gen. n., both parasites of *Prodecatoma parodii*, and *Apanteles alexanderi*, parasitising a Lepidopteron attacking *Opuntia* sp.

Spinosa (J. P.). **Apuntes sobre el Cultivo del Naranjo referidos especialmente al Territorio Nacional de Misiones.** [Notes on Orange Cultivation with special Reference to the Misiones Territory, Argentina.]—*Bol. Minist. Agric. Nac., Buenos Aires*, xxvii, no. 1, January-March 1922, pp. 3–185, 31 figs. [Received 9th August 1922.]

Insect pests of the orange in the Misiones Territory include the scales, *Coccus* (*Lecanium*) *hesperidum*, L., *Lepidosaphes beckii*, Newm. (*Mytilaspis citricola*, Pack.), and *Chrysomphalus aonidum*, L., against which spraying with kerosene-soap emulsion is advised; Aphids, for which a tobacco soap is recommended; ants, which are highly destructive and against which fumigation with carbon bisulphide or with a mixture of two parts sulphur and one naphthaline or flooding with poisons or

kerosene in water have proved efficacious ; and the orange caterpillar, *Papilio thoas thoantiades*, Burm., for which a spray containing Paris green is advocated. The preparation and application of these remedies are described.

BISBY (G. R.) & TOLAAS (A. G.). **The Use of Bordeaux Mixture for Spraying Potatoes.**—*Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul*, Bull. 192, June 1920, 32 pp., 4 figs. [Received 9th August 1922.]

In discussing the effect of Bordeaux mixture for the control of various fungous and insect pests of potatoes, it is stated that it has a repellent effect on the leafhoppers that cause tipburn [*Empoasca mali*] ; it does not seem to kill them, but they go for preference to unsprayed plants [*R.A.E.*, A, vi, 489 ; vii, 278 ; ix, 31, etc.].

CHAPMAN (R. N.). **Insects infesting Stored Food Products.**—*Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul*, Bull. 198, December 1921, 76 pp., 27 figs. [Received 9th August 1922.]

This popular account of the insects infesting stored food products is divided into sections containing the information most useful to seedsmen, grain dealers, millers, managers of warehouses, bakers, householders, etc. An illustrated table is given for determining the species of insect concerned, and notes are given on the life-history, habits and economic importance of each, with instructions in general remedial measures, such as heat, fumigation, and the best methods of storing cereal products.

FLEBUT (A. J.). U.S. Bur. Ent. **The Grape Mealybug.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 6–11.

The question of remedial measures against the grape mealybug [*Pseudococcus bakeri*, Essig] is a difficult one. Fumigation has so far given unsatisfactory results [*R.A.E.*, A, ix, 111 ; x, 315], and the only practicable remedy is spraying, though this cannot be entirely efficacious owing to the nature of the injury by this pest and to the fact that a few insects missed by the spray are sufficient to cause considerable loss to the crop. The results of spraying depend more upon care of application than upon the materials used. Almost any miscible oil gives good results if carefully applied. The most successful treatment seems to be a dormant spray of 24–28° Bé. oil applied with a spray gun. This appeared to give 83 to 89 per cent. mortality. It was followed by a delayed dormant spray after the buds opened with oil of 34–38° Bé., which gave 88 to 93 per cent. mortality. Unfortunately frosts during the first test and the activities of *Pseudaphycus notativentris* in destroying numbers of the mealybugs during the second rather interfered with the accuracy of the counts. In some cases, cresol soap was added to the spray to increase the penetration.

Although sodium cyanide fumigation in general gave unsatisfactory results, the use of 1–1½ oz. in liquid form cleaned the trees in the latter part of February when all the eggs had hatched and practically all the larvae were on the arms and spurs. This result is not entirely conclusive, for no insects were found even on the control trees at picking time, but it is considered to warrant further investigation.

WELDON (G. P.). **Spraying Deciduous Fruit Trees.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 24–30.

The spraying of almond trees should be more general in California in order to deal with the red spider [*Tetranychus telarius*], which is a very common pest. Apricots need to be sprayed principally for the brown apricot scale [*Eulecanium corni*] and black apricot scale [*Saissetia oleae*]. The trees should be sprayed with miscible oil in November or December at the latest, but not before migration to the twigs has taken place when the foliage drops. Apple trees require annual spraying for codling moth [*Cydia pomonella*]; peach trees are best treated with Bordeaux mixture in the autumn, followed by lime-sulphur applications in early spring just as the buds are opening. Peaches suffer considerably from attacks of *Anarsia lineatella* (twig borer), which would also be controlled to a large extent by this spraying.

DE ONG (E. R.). **Summary of Measures for Control of Red Spiders on Deciduous Trees.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 30–36.

The mites dealt with are *Tetranychus telarius*, L., which is generally active through summer and autumn; *Bryobia praetiosa*, Koch, primarily a pest of almond and prune, and active during spring and early summer; and *Paratetranychus pilosus*, Garm. (citrus red spider), found on *Citrus* and deciduous trees throughout spring and summer. Brief notes are given on the life-history and habits of these mites [*R.A.E.*, A, ix, 512]. Remedial measures are discussed and are similar to those recommended previously [*loc. cit.*], except that ½ lb. calcium caseinate is substituted for the glue water in the first formula and for the flour paste in the second. The cost of spraying and dusting is compared, and although the latter is less expensive for a single application per acre, it is generally found that two or three applications are required, and even then they may be less effective than one thorough spraying.

BORDEN (A. D.). U.S. Bur. Ent. **Control of the Citrus Red Spider.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 36–39.

The citrus red spider [*Paratetranychus pilosus*] is one of the most important pests in the citrus orchards of Southern California. The adults live about 30 days, each female depositing about 30 eggs, but temperature has a great influence on longevity. The heaviest infestations are generally during May and June, and as the natural enemies do not appear in numbers before late July total defoliation may occur, causing severe damage to the fruit. During August and September infestation is generally held in check by natural enemies, which include the Coccinellid, *Stethorus picipes*; the Coniopterygid fly, *Conventzia hageni*; the Staphylinid beetle, *Oligota oviformis*; a large undetermined purple thrips; the green lacewing, *Chrysopa californica*; and the brown lacewing, *Hemerobius pacificus* [*cf. R.A.E.*, A, i, 143]. As spraying with 3 and 5 per cent. liquid lime-sulphur had not given good results against this mite, an emulsion was tried composed of a low-grade distillate oil with powdered soap and a small quantity of *cresolis compositus*. The soap powder was found to cause pitting of the fruit, and was therefore replaced by a vegetable oil liquid soap with a

potassium base, while a better grade distillate was used. Two proprietary miscible oils with sulphur combinations were tried, but no sulphur combination gave more than 50 per cent. mortality, while oil emulsions gave from 95 to 98 per cent. An emulsion containing 1 per cent. oil gave 100 per cent. mortality of the eggs. Some type of spreader is necessary for use with these emulsions ; lime-casein was found impracticable as it combines with the soap and liberates the oil ; casein and borax were fairly good, but with further investigation it is hoped to obtain a better spreader.

In no case has dusting with sulphur given good results ; it is necessary to have the maximum temperature above 90° or a mean temperature above 75° for this remedy to be effective against *P. pilosus*.

QUAYLE (H. J.). **Control of the Codling Moth in Walnuts.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 40–43.

The only satisfactory remedy against the codling moth [*Cydia pomonella*, L.] in walnuts is to coat the nuts with some poison that will destroy the larvae before they effect an entrance. Tests made in 1920 and 1921, in continuation of those already recorded [*R.A.E.*, A, viii, 238], show an undoubted superiority of spraying over dusting. The material recommended is 6 lb. basic lead arsenate to 200 U.S. gals. water. For dusting, 10 per cent. of lead arsenate seemed the best, with kaolin, hydrated lime or refuse lime from beet-sugar factories as a carrier. For the control of the walnut aphis, *Chromaphis juglandicola*, either alone or with codling moth, the addition of Black-leaf 40 has been suggested [*R.A.E.*, A, x, 286]. The development of *C. pomonella* varies according to the season, but, as a rule, treatment should be from about the last week in May to the last week in June. The nuts should be as large as possible at the time of spraying, though this is less important than the condition of the calyx in the case of apples.

COLLINS (C. F.). **Control of Citricola Scale.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 43–45.

Fumigation with liquid hydrocyanic gas, as practised in California against the citricola scale [*Coccus citricola*], is described. The process is begun as soon as all the scales have hatched (about mid-July in Tulare County), and usually continues until October. For two or three weeks late in August the scale seems more than usually resistant, and poorer results are obtained. The dose is generally 18 cc. until September, when the weather becomes cooler, and 20 cc. is then used. Spraying is still practised to some extent, but its cost is equal to that of fumigation, and the results are far less satisfactory.

ARMITAGE (H. M.). **Biological Control with particular reference to the Mealybug and Black-scale Work in Southern California.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, xi, no. 7, July 1922, pp. 45–50.

The problem of biological control resolves itself into the production of a controlled quantity of desirable natural enemies that can be liberated with regard to the seasonal development of both enemy and host at a cost that will permit this method to compete with commercial remedies. The Coccinellid, *Rhizobius* [*ventralis*], or the Chalcid, *Scutellista*

[*cyanea*], give excellent results in control of the black scale (*Saissetia oleae*, Bern.) in Southern California about once in three or four years. In the following year, however, the food supply has become so low that they are almost starved out of existence ; it is at this point that the reintroduction of numbers of the parasites is required to maintain the requisite degree of control. This problem has practically been solved in the case of the Coccinellid, *Cryptolaemus montrouzieri*, Muls., used against *Pseudococcus* spp. [*R.A.E.*, A, viii, 318], and that of *Aphycus lounsburyi* against *S. oleae* [*R.A.E.*, A, ix, 339]. Accounts are given of the rearing and distribution of these two species.

FULLAWAY (D. T.). **Annual Report for Calendar Year 1921.**—*Hawaiian Forester & Agric., Honolulu*, xix, no. 5, May 1922, pp. 103–105.

The various projects and investigations recorded for the year have been previously noticed. The beneficial insects liberated during the year included *Galesus silvestrii* 6,900, *Diachasma tryoni* 13,322, *Tetrastichus giffardianus* 24,650, *Dirhinus giffardi* 6,300, *Opius humilis* 3,780, and *Diachasma fullawayi* 10,450, all being parasites of the fruit-fly [*Ceratitis capitata*] ; *Opius fletcheri* 41,425, a parasite of the melon fly [*Dacus curcubitae*] ; and *Paranagrus osborni* 3,400, a parasite of the corn leafhopper [*Peregrinus maidis*].

EHRHORN (E. M.). **Division of Plant Inspection. Annual Report for Calendar Year 1921.**—*Hawaiian Forester & Agric., Honolulu*, xix, no. 5, May 1922, pp. 105–107.

This is a record of the work of the plant inspection division during 1921, most of which has been previously noticed in the monthly reports.

EHRHORN (E. M.). **Reports of the Chief Plant Inspector for February–April 1922.**—*Hawaiian Forester & Agric., Honolulu*, xix, nos. 4, 5 & 6, April, May & June 1922, pp. 87–88, 116–117 & 140–141.

The pests intercepted include : From Australia, *Chionaspis citri* on lemons ; from China, *Aphis* sp. on *Caladium*, and *Lepidosaphes* sp. on pomelo ; from Japan, *Pseudaonidia trilobitiformis*, *Parlatoria pergandei* and *Hemichionaspis aspidistrae* on tangerines ; from the Philippines, *Pheidole* sp. in seeds, and weevils in betel nuts ; from the United States, *Pseudococcus gahani* and *Brevicoryne* (*Aphis*) *brassicae* on plants from California and *Pseudococcus maritimus*, *P. longispinus* and *Hemichionaspis aspidistrae* on various plants ; from New Zealand, *P. maritimus* on pears.

HAYES (W. P.). **Method of Procedure in Insect Life History Investigations.**—*Canadian Ent., Orillia*, liv, no. 4, April 1922, pp. 73–77.

The importance of careful life-history investigations as an aid to the control of injurious insects and the necessity for a methodical plan of study are pointed out. A system upon which to work in preparing such data is suggested.

KNULL (J. N.). **Annotated List of the Buprestidae of Pennsylvania [Coleoptera].**—*Canadian Ent., Orillia*, liv, no. 4, April 1922, pp. 79–86.

This list of the Buprestids of Pennsylvania, arranged according to Leng's catalogue, has been compiled from original rearings and collecting

records and observations, and from several existing collections. The food-plants where known are recorded, many of the beetles being of economic importance, especially those of the genus *Agrilus*.

SATTERTHWAIT (A. F.). U.S. Bur. Ent. **Notes on the Food Plants and Distribution of certain Billbugs.**—*Ecology* [*Brooklyn, N.Y.*], ii, no. 3, July 1921, pp. 198–210, 1 fig. [Received 9th August 1922.]

As a result of much injury to crops by billbugs, a study has been made of North American species, and preliminary notes are given here on the distribution and food-plants of several species not dealt with in the author's previous bulletin [*R.A.E.*, A, vii, 378]. The areas examined were shortly to be reclaimed for agricultural purposes, so that the natural habitat of the weevils could be ascertained and at the same time valuable data secured for the prevention of losses to new crops. *Sphenophorus* (*Calendra*) *ludovicianus*, Chttn., one of the largest species, is known as the chicken weevil, because chickens frequently pick up the weevils, which thereupon fix their legs and claws into the bird's mouth or throat so that they cannot be swallowed and may cause death. Adults have been found in the winter in cells under timber or logs near water. The knife-flag (*Zizaniopsis miliacea*) was found to be infested to the extent of 90 per cent. with the larvae, which work at the bases of the leaves at the root crown, pupation probably occurring normally in the soil but sometimes within the plant.

S. costicollis var. *callosipennis*, Chttn., was taken on a species of *Carex*, probably *C. lurida*, in the larval stage, and has also been reared on timothy grass. Pupation was observed in the cut-off stalk of *Carex*; adults in cages were fed on wheat and various grasses. *S. cariosus*, Oliv., was found infesting *Cyperus erythrorhizos* and *Rhynchospora corniculata* growing near trees. Maize in close proximity was so badly damaged by billbugs, partly this species, that the field was sown to cowpeas. It has also been recorded as destroying rice in freshly broken fallow land where the native food-plants had been destroyed. *S. ulkei*, Horn, was collected among the roots of bluegrass. *S. scoparius*, Horn, has been found destroying rice in the field, and has also been taken on *Carex* sp. (probably *C. lurida*), on cat-tail and one female on maize. *S. compressirostris*, Say, has been found in prairie land where the predominating grass was *Bouteloua*, and also destroying maize in a field sown after removal of the native food-plants. *S. melanocephalus*, F., has been taken in small numbers on timothy, cat-tail and various food-plants, and has been fed in cages on various grasses and on wheat stems.

S. glyceriae, Chttn., and *S. glyceriae* var. *missouriensis*, Chttn., were found in numbers ovipositing on *Glyceria septentrionalis* (manna grass). *S. germari*, Lec., was taken on flooded rice and was fed in cages on timothy grass, *Cyperus strigosus* and maize.

Présence du *Leptinotarsa decemlineata*, **Say (Col. Chrysomelidae) en France.**—*Bull. Soc. Ent. France, Paris*, 1922, no. 12, 28th June 1922, p. 166.

The capture of *Leptinotarsa decemlineata* in potato fields close to Bordeaux is recorded.

HUSTACHE (A.). **Nouveaux Alcides du Congo français.** [**Col. Curculionidae.**]—*Bull. Soc. Ent. France, Paris*, 1922, no. 11, 14th June 1922, pp. 150–155.

Among new species of the genus from the French Congo, *Alcides gossypii*, captured on cotton plants, is described.

FULLER (C.). **The Termites of South Africa.**—*S. African Jl. Nat. Hist., Pretoria*, iii, no. 2, March 1922, pp. 70–131. [Received 15th August 1922.]

In this instalment of his work on the termites of South Africa [*R.A.E.*, A, ix, 579] the author describes the following new species, *Macrotermes usutu*, from Swaziland; *M. ukuzii*, from Zululand; *Odontotermes okahandjae*, from Damaraland; *Microtermes havilandi* f. *intermedius*, n., from the Transvaal and Bloemfontein, and f. *occidentalis*, n., from Griqualand West and Colesberg; *M. lounsburyi* and *M. umfolozii* from Zululand; *M. mokeetsei*, from N.E. Transvaal; *M. dubius*, from Damaraland; *M. etiolatus*, from Lourenço Marques and the Transvaal; *Ancistrotermes lebomboensis*, from the Transvaal; *Trinervitermes gemellus thomseni*, subsp. n., from Natal; *T. havilandi* from Natal (perhaps also widely distributed in the Transvaal and Orange Free State); *T. kurumanensis*, from Bechuanaland; *T. umzinduzii*, from Pietermaritzburg; *T. pretoriensis*, from Pretoria; *T. abassas*, from Namaqualand; *T. thermarum*, from Bushveld Basin; *Subulitermes hainesi*, from Kenhardt; *Tenuirostritermes mallyi*, from Cape Colony; *Hamitermes gunni*, from Bathurst; *H. londonensis*, from East London; *H. zuurbergi*, from Zuurberg; *H. kellyi*, from Grahamstown; *H. schoombiensis*, from the Middleburg district; *H. libertatis*, from Bloemfontein; *H. limpopoensis*, from the Northern Transvaal; *H. atlanticus*, from near Capetown; *H. braunsi*, from Willowmore; *H. bechuana*, from Barkly West; *H. murraysburgi*, from Cape Province; *H. kenhardti*, from Cape Province; and *H. messinae*, from the Northern Transvaal.

Keys are given to the species of *Macrotermes*, *Termes*, *Microtermes* and *Hamitermes* and to the *Nasutitermes* group.

AINSLIE (G. G.). U.S. Bur. Ent. **Contributions to a Knowledge of the Crambinae. II.** *Crambus laqueatellus*, **Clemens.**—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June 1922, pp. 125–136, 2 figs.

The distribution, seasonal history and habits of *Crambus laqueatellus*, Clem., as well as the various stages of the insect, are described. This moth is apparently of little, if any, economic importance, and although it has been once recorded as injuring grass and small grain, this was probably a case of mistaken identity.

FLINT (W. P.). **Studies on the Life History of** *Nomophila noctuella*.—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June 1922, pp. 154–156.

The Pyralid moth, *Nomophila noctuella*, became very abundant in Illinois during 1919, seriously injuring newly-sown sweet clover. From observations made during that year and 1920 there appear to be four generations a year, the average length of each stage being 6 days for the egg, 30 for the larva, 10 for the pupa and 50 for the adults. The winter is probably passed in heavy silken cases at or just below the surface of the ground.

This species has been noted by Felt as feeding mainly on leguminous plants. During these observations preference was shown for red clover (*Trifolium pratense*), sweet clover (*Melilotus alba*) and lucerne (*Medicago sativa*). It has also been found in a few cases on blue grass (*Poa pratensis*), purslane (*Portulaca oleracea*), maize (*Zea mays*), wild

mustard (*Brassica arvensis*), cinquefoil (*Potentilla canadensis*), white clover (*Trifolium repens*), foxtail (*Setaria glauca*), and in one instance on soy beans (*Glycine hispida*), the latter having been planted on clover sod.

A small percentage of the larvae was found to be parasitised. Lead arsenate 2 lb. to 50 U.S. gals. water gave complete control in fields of young sweet clover.

FROST (S. W.). **Ecdysis in** *Tmetocera ocellana*, **Schiff.**—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June, 1922, pp. 164–168, 1 fig.

An account is given of the moulting of the larva of *Eucosma* (*Tmetocera*) *ocellana*, Schiff., about which very little has been previously published.

LARRIMER (W. H.). U.S. Bur. Ent. **An Extreme Case of delayed Fall Emergence of Hessian Fly** (*Phytophaga destructor*, **Say**).—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June 1922, pp. 177–180, 3 figs.

Some interesting observations were made on the emergence of the Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, in the northern part of the east central United States, following an unusual season from June to September, when the mean temperature was from 3–6° below normal, and during September and October, when it was from 6–10° above normal, rainfall being more or less general but varying remarkably. The effect of these conditions is shown by means of graphs. From records made at Indiana and compared with others from Illinois it was determined that the emergence of the "late wave" occurred in the reverse order to the normal, that is, it occurred earlier instead of later to the southward. From the latitude of Cincinnati southward the dates of emergence come within the recommended period for safe sowing and can be considered as normal.

It was noticed in the course of these observations that about 40 per cent. of the larvae produced at the beginning of the period did not pupate at the normal time (*i.e.*, about 11th October), but passed the winter in old summer stubble. Pupation of these larvae took place in the following spring, while those larvae arising from the normal emergence of the preceding autumn pupated at approximately the same dates, so that emergence of the adults was practically simultaneous in the spring.

FOLSOM (J. W.). **Pollination of Red Clover by** *Tetralonia* **and** *Melissodes*.—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June 1922, pp. 181–184.

Observations and experiments are described which prove that the bees, *Tetralonia dilecta*, Cress., and *Melissodes bimaculata*, Lep., pollinate red clover to an important extent—the former in late May and June (in Central Illinois) and the latter during July.

GRISWOLD (G. H.). **Are there two Species of the Oyster-shell Scale?**—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xv, no. 2, June 1922, pp. 184–191, 4 figs.

Lepidosaphes ulmi, L. (oyster-shell scale) has been studied for the past three years, with the result that three distinct differences have

been found between the forms occurring on the apple and those developing on lilac. In appearance, those on apple are always of a uniform brown, while those on lilac are pale grey with distinct bands traversing them. The apple form was found to develop from two to four weeks ahead of the lilac form. Attempts to interchange the food-plants of the apple and lilac forms showed that, while transfers were successful from apple to other trees, in no case could the lilac form of scales be made to live for any length of time on apple or pear, and the scales produced by the apple form on other food-plants were always of the uniform brown colour.

As several authors have drawn attention to the variation in the number of circumgenital pores of this scale from different food-plants, an extensive count was made, and this showed that the commonest number of these pores for an individual of the apple form is from 70–74, while those of the lilac form most commonly have from 100–104. A study is now being made of the pygidium of the second instar.

An examination of the scales and counts of the circumgenital pores show that Coccids of the apple form are found also on the dogwoods, *Cornus alba, C. alternifolia* and *C. rugosa*, and on mountain maple (*Acer spicatum*). The biological development of the insects on *C. alba* has been studied and is parallel to that of the apple form. The lilac form was found on American ash (*Fraxinus americana*), European ash (*F. excelsior*), fringe tree (*Chionanthus virginica*), laurel-leaved willow (*Salix pentandra*), large-toothed aspen (*Populus grandidentata*), Lombardy poplar (*P. nigra* var. *italica*), Carolina poplar (*P. eugenii*), trembling aspen (*P. tremuloides*), witch-hazel (*Hamamelis virginiana*), New Jersey tea (*Ceanothus americanus*), golden currant (*Ribes aureum*) and heart-leaved willow (*Salix cordata*). The biological development of the individuals occurring on the first six named food-plants has been found to agree closely throughout the life-cycle with that of the lilac form.

It is thought that this evidence clearly indicates that there are two species of the oyster-shell scale.

SAVASTANO (L.). **I Controparassiti e gli Insetticidi della Biancarossa degli Agrumi.** [Parasitic Enemies and Insecticides in connection with *Chrysomphalus dictyospermi*.]—*Riv. Agric., Parma*, xxvii, nos. 29 & 31, 21st July & 4th August 1922, pp. 443–444 & 470–471.

In this brief review the following insect enemies of *Chrysomphalus dictyospermi*, Morg., are recorded as common in Italian citrus plantations: *Chilocorus bipustulatus*, L., *Exochomus quadripustulatus*, L., *Rhizobius lophantae*, Blaisd., *Aphelinus chrysomphali*, Merc., and *Aspidiotiphagus citrinus*, How. These are moderately useful. The value of *Prospaltella lounsburyi*, Berl., recently imported from the Azores, remains to be ascertained. Insecticides cannot be dispensed with. Lime-sulphur has proved advantageous because both lime and sulphur are easily obtainable in Italy, while it can be used by any citrus grower and the firewood required is ready to hand. Fumigation with hydrocyanic acid gas has practical disadvantages. It must be remembered that *C. dictyospermi*, which was so threatening a pest on its first invasion of Italian citrus plantations, has gradually become less dangerous, and during the past five years, in spite of the neglect of measures during the war, damage by it has decreased to such a

degree that in some localities spraying is not carried out. All oranges, and such lemons as are intended for table consumption, must be clean, whereas lemons for industrial purposes need not be so scrupulously free from infestation; this difference requires to be borne in mind when calculating the cost of remedial measures.

STELLWAAG (F.). **Neuzeitliche Schädlingsbekämpfung im Obst- und Gemüsebau.** [Modern Pest Control in Fruit and Vegetable Cultivation.]—*Wiesbaden*, R. Bechtold & Co., 1922, viii + 116 pp., 40 figs. Price 150 marks.

This small volume gives the fruit and vegetable grower accurate, practical and concise information on insect pests and their habits, and on the preventive and remedial measures best adapted to combat them. The text is arranged according to the plants affected, each heading being divided according to the injury caused. The final chapters on artificial and biological measures are followed by a full index.

MÜLLER (A.) & RASCH (W.). **Schädliche Insekten und Nager.** [Injurious Insects and Rodents.]—*Frankfurt a. Main*, Deutsche Gesellschaft für Schädlingsbekämpfung, 1922, 23 pp., 2 col. pls.

The pests dealt with include the principal insects attacking man or his household goods and foodstuffs. In the case of each insect general notes are followed by short descriptions of the various stages and of their biology. The aim of this pamphlet is to popularise exact information regarding these pests, and this is achieved in a simple and effective manner.

PEMBERTON (C. E.). **Mites and other Organisms in their possible Relation to Sugar Cane Root-rot in Hawaii.**—*Hawaiian Planters' Record, Honolulu*, xxvi, no. 3, July 1922, pp. 145–147, 1 fig.

Extensive injury to sugar-cane roots, which does not appear to be due to fungi, has been observed in Hawaii in both young and mature plants and in ratoons. Holes were abundant in tender, growing roots from the tip to the base, scattered through dead roots and particularly common in small roots just starting. A minute brownish mite has been found wherever the typical root injury occurs, but its real importance has yet to be determined. Other possible cane root feeders are other Acarids, Nematodes, ants and active Crustaceans. It is too early to state definitely the part played by mites and other animal organisms in the formation of these root-holes, but the recognition of the injury opens a new field for biological investigation.

WILLIAMS (F. X.). **Entomological Work in the Philippines, September 1920–April 1922.**—*Hawaiian Planters' Record, Honolulu*, xxvi, no. 3, July 1922, pp. 173–177.

The work done from September 1920 to April 1922 included attempts to secure natural enemies, for importation into Hawaii, of the wireworms, *Monocrepidius exul* and *Simodactylus cinnamomeus*, which damage sugar-cane fields there, and to import the fig wasp which pollinates the flowers of *Ficus retusa*.

Wireworms are not a recognised pest in the Philippines, and no parasites were found. Several shipments of figs of *Ficus retusa* bearing fig insects (*Blastophaga*) were made to Hawaii, but neither those from the Philippines nor those from Hongkong yielded the proper species.

Approximately 3,000 eggs of a butterfly related to *Lampides (Polyommatus) baetica*, which damages the flowers and seeds of sann hemp, cowpeas, etc., were shipped, but did not yield an egg-parasite. A small consignment of an Ichneumonid wasp that parasitises the larvae was liberated, as well as some *Odynerus*, one species of which stores its nest with Lycaenid caterpillars. Woolly aphis (*Oregma*) on sugar-cane and bamboo was found to be attacked by the larva of a small moth. Three speceis of Sphegid wasps that prey on mole-crickets (*Gryllotalpa*) and field-crickets (*Gryllus*) have been released in Honolulu. *Onites phartopus*, *Catharsius molossus* and *Onthophagus* sp., enemies of the horn fly [*Lyperosia*] were shipped, but only a few of the latter beetle matured and were liberated. A Philippine Histerid beetle occasionally found under manure was shown to devour fly larvae.

A study was made of enemies of the seeds of *Tephrosia candida* and *Leucaena glauca*. The larva of a small moth (*Bactra* sp.) and a small weevil are being tested in quarantine on some agricultural plants that they might injure if liberated. These insects weaken or destroy nut-grass (*Cyperus rotundus*) in the Philippines. A parasitic Hymenopteron and a small Tachinid prey on the moth, and the beetle is occasionally killed by the larva of a Chalcid.

Of sugar-cane pests, *Mecistocerus* sp. was found and also larvae of Pyralids, Noctuids and Tortricids, especially the first-named. The sugar-cane aphis [*Aphis sacchari*] was not plentiful, but a woolly aphis (*Oregma lanigera*) was abundant, though scarcely harmful, as well as *Pseudococcus sacchari*.

METALNIKOW (S.). **Une Epizootie chez les Chenilles de** *Galleria mellonella*.—*C. R. Hebdom. Acad. Sci., Paris*, clxxv, no. 1, 3rd July 1922, pp. 68–70.

An elongated rod-shaped organism has been isolated from larvae of *Galleria mellonella* that had succumbed to disease. Subsequent cultures of these organisms ingested by healthy larvae also proved fatal.

The study of this organism is being continued with the view to the possibility of using it for the control of *G. mellonella* and other noxious insects.

THOMPSON (W. R.). **Théorie de l'Action des Parasites entomophages. Accroissement de la Proportion d'Hôtes parasités dans le Parasitisme cyclique.**—*C. R. Hebdom. Acad. Sci., Paris*, clxxv, no. 1, 3rd July 1922, pp. 65–68.

The question of the proportionate reproduction of parasites and their hosts [*R.A.E.*, A, x, 386] is further discussed, and it is pointed out that the apparent ineffectiveness of a given parasite attacking a given host may be explained by the slow dispersal of certain parasites; in such cases, given sufficient time, its ultimate success may be expected.

DUPORT (L.). **Rapport sur les Travaux poursuivis à la Station [Entomologique de Cho-Ganh] en mars, avril et mai 1922.**—*Supplement to Bull. 135, Chambre d'Agric. Tonkin & Nord-Annam, Hanoi*, no. 16, 1922, 5 pp. [Received 18th August 1922.]

The production of the Braconid, *Doryctes strioliger*, Kieff., has been more than double that of 1921 [*R.A.E.*, A, x, 437], and is still increasing, so that this year the value of this parasite against the coffee

borer, *Xylotrechus quadripes*, Ch., ought to be definitely ascertained. Unfortunately it does not show much sign of multiplying in the plantations after liberation, being largely influenced by adverse weather conditions and by the attacks of natural enemies. *D. picticeps*, Kieff., has practically disappeared since 1920, probably owing largely to the destruction of unhealthy coffee stems by burning, but more are being reared on infested teak for distribution on coffee. *D. tristriatus*, Kieff., has proved as yet too difficult to rear for plantation tests to be made, but it is hoped to get better results in 1922.

Ichneumonid parasites have been very scarce during the period under review. The Evaniid, *Pristaulacus nigripes* var. *duporti*, Kieff., has been reared on infested coffee, but has produced no result when placed upon fresh stems of infested coffee. The Bethylid, *Sclerodermus domesticus*, Latr., is considered the most efficient enemy of the borer, and is being reared in large numbers. Up to 15th May, in 1922, 16,000 individuals had been liberated in the plantations.

In addition to infested coffee stems for the rearing of parasites, other plants are being used, such as teak, *Oroxylon indicum*, *Randia dumetorum*, etc., as well as bamboo attacked by *Chlorophorus annularis*.

Experiments with repellents against *X. quadripes* are still being continued ; none has as yet given much success.

Another insect that has been observed living within the branches of coffee is a species of *Collyris*, probably *C. fuscitarsis*, Schm. ; an allied Cicindelid is known as a minor coffee pest in Java and British India [*R.A.E.*, A, v, 122, 164].

HALL (W. J.). **The Hibiscus Mealy Bug** (*Phenacoccus hirsutus*, **Green**).—*Egypt Minist. Agric., Cairo*, Tech. & Sci. Ser., Bull. 17, 1921, 28 pp., 1 map, 6 plates. [Received 19th August 1922.]

This bulletin gives in a more extended form than has previously been noticed [*R.A.E.*, A, x, 449] a good deal of information regarding *Phenacoccus hirsutus*, Green (hibiscus mealy-bug). A list of the food-plants most commonly found is given, divided into 28 species of primary food-plants, *i.e.*, plants on which the mealy-bug thrives and breeds rapidly ; secondary food-plants, numbering 43, on which breeding occurs, but which rarely become very badly attacked unless close to a heavy infestation ; and 31 tertiary food-plants, on which the pest is rarely found and to which it never does any serious damage. The transport of plants and fruit from infested areas is the chief method of distribution of the pest before its presence becomes well-known. Wind can undoubtedly carry the insect over long distances, and it is rather significant that it has spread considerably further to the south than to the north—the prevailing wind being from the north. Birds also convey infestation by transporting young larvae or eggs on their bodies from tree to tree.

Particulars of fumigation experiments are described, this method not proving very practicable. A paraffin emulsion is recommended, consisting of 2 gals. paraffin to 1 gal. of water, with ½ lb. soap. This may be used in varying dilutions from 1 in 15 to 1 in 50 ; the most effective for general work was 1 in 15, in which case 1 lb. soap was used. A spray of 40 lb. unslaked lime, 20 lb. sulphur and 15 lb. salt in 60 gals. of water is advised for winter work ; this is rather more expensive than the emulsion.

No parasite of *P. hirsutus* has been reared from it in sufficient quantities to promise any success as a control. The commonest

natural enemy was a small Corylophid beetle, *Sericoderus pecirkanus*, Reitt., while others that were fairly numerous were *Mucropalpus pygmaeus*, Ramb., the Coccinellid, *Oxynychus erythrocephalus*, F., and a large Chalcid. Less numerous were *Coniopteryx psociformis*, Curt., *Chrysopa vulgaris*, Schn., the Coccinellids, *Scymnus biverrucatus*, Panz., *S. syriacus*, Mars., *Novius* (*Vedalia*) *cardinalis*, Muls., the Lathridiid, *Melanophthalma carinulata*, Mot., 37 unidentified Chalcids, the Braconid, *Phanerotoma dentata*, Panz., and three other unidentified species, the Noctuids, *Rivula sericalis*, Sc., and *Eublemma gayneri*, Rot., and a Cecidomyiid, *Diplosis* sp.

The appendices to this paper comprise a list of the principal food-plants of this mealybug and a description of a method of preparing specimens of it for microscopical examination.

Criddle (N.). **Beetles injurious to Sunflowers in Manitoba.**—*Canad. Ent., Orillia*, liv, no. 5, May 1922, pp. 97–99.

Zygogramma (*Calligrapha*) *exclamationis* (sunflower leaf beetle) may become an important pest, as it exclusively feeds on these plants and has already spread from wild to cultivated sunflowers. The adults emerge from hibernation in June, and the eggs are laid at the end of the month until July, being placed singly—but frequently in irregular rows—on the stems and the lower surfaces of the leaves. Egg-laying extends over a period of two or more weeks, and a single female may deposit at least 200. The larvae are usually found clustered around the crown of the plant feeding on the newly formed leaves. Pupation occurs towards the end of July in the soil near the plants where the larvae have fed at various periods. Both adults and larvae feed on the leaves, and have been noted on *Helianthus giganteus* and *H. annuus petiolaris*. There is only one generation a year in Manitoba. A brief description is given of the egg, larva and adult. Sprays similar to those for potato beetles are recommended as effective.

Mordellistena pustulata, Melsh. (sunflower pith beetle) was first found in the stems of *Amarantus retroflexus* (red-root pigweed) and later hibernating in sunflower stems. The larvae feed on the pith, but also injure the more woody parts; they occur most frequently near the base of the plant, though any portion of the stem may be infested. Several larvae may infest a single stem, remaining there till the following spring, when they pupate, the adults emerging in June. Most of the adults are found on the flowers.

A weevil, *Desmoris constrictus*, Say, has been found in some numbers feeding on the blossoms, but it is not known whether it will become of economic importance.

Graham (S. A.). *Ips pini*, **Say, as a primary Pest of Jack Pine.**—*Canad. Ent., Orillia*, liv, no. 5, May 1922, pp. 99–100.

In the summer of 1921, *Ips pini*, Say, which usually infests only dead or dying trees, attacked young growing pines, *Pinus divaricata* and *P. resinosa*, in Minnesota. The attack was concentrated on a few trees only, and these were heavily infested from the surface of the ground almost to the top with beetles of the first brood. At least 90 per cent. of both larvae and adults were destroyed by woodpeckers, but those in the felled trees near by, which had apparently attracted the insects, escaped. The presence of newly felled trees near freshly cut logs emphasises the fact that trap trees should be used with the greatest caution.

EWING (H. E.). U.S. Bur. Ent. **Studies on the Taxonomy and Biology of the Tarsonemid Mites, together with a Note on the Transformations of** *Acarapis* (*Tarsonemus*) *woodi*, **Rennie. (Acarina.)**—*Canad. Ent., Orillia*, liv, no. 5, May 1922, pp. 104–113, 3 figs.

A key is given to the families and genera of Tarsonemid mites, and to the males of the genus *Tarsonemus*. The food-plants of *T. pallidus*, Banks, the feeding habits of *Pediculoides ventricosus*, Newport, and the transformations of *Acarapis woodi*, Rennie, are recorded. The enormous size of the egg of *A. woodi* is due to the fact that it has a quiescent, apodous nymphal stage. Such a nymph must have handed on to it an added supply of energy; for this purpose the larva receives an abnormal amount at the time of hatching, which it gets in the form of egg substance, and it increases but little in size afterwards.

The transformations of Tarsonemid mites, with a comparative table illustrating the different instars of the above species and of *Pediculopsis graminum*, and the degeneration and adaptation in parasitic species are also discussed.

JARVIS (H.). **Fruit Fly Investigations. Third Progress Report.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 1, July 1922, pp. 15–17.

Further investigations [*R.A.E.*, A, x, 416, 477] on *Dacus ferrugineus* (*tryoni*) have been made. This fly is rarely seen in winter in orchards or sheltering in packing sheds, and the female seems less able to stand cold than the male. No indication of its hibernating as a mature insect has been noticed. Pupae have recently been found in the ground below cases of stored apples and quinces. So long as they are protected from light they do not necessarily require access to soil to enable them to pupate. Temperature is an important factor in determining the duration of the pupal period, and some results of laboratory observations on this point are given. Experiments on the subjection of infested fruit to cold storage show that a temperature of from 33 to 34° F. for a period of three weeks kills all eggs and larvae, and it is probable that a shorter period will be found quite as effective.

Another injurious insect is *Calandra oryzae* (grain weevil), which damages stored apples, but has so far not been known to damage fruit in orchards. *Heliothrips* sp. has been found attacking garden shrubs, and if met with on economic plants or trees may be sprayed with miscible oil, tobacco extract or kerosene emulsion. The bagworm, *Thyridopteryx hübneri*, which damages pine (*Pinus insignis*), should be watched for in orchards, as it has developed a taste for apple foliage. *Psylla mali* has also caused considerable damage to apple. The Stratiomyiid fly, *Neoexaireta spinigera*, is abundant and breeds in decaying vegetable matter, but does not cause primary injury to fruit or vegetables.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 1, July 1922, pp. 32–34.

Cane beetles have been much in evidence in 1921–22, but recent rainfall may check the worst period of larval activity. Information has been received regarding the influence of climatic conditions as a controlling factor during the period of oviposition, showing that when early thunderstorms are followed by a week of continuous rain the larvae will be numerous the next year, but that if one or two days of wet are followed by dry weather lasting from four to six weeks there will be fewer of them.

Preliminary tests with a variety of sugar-cane said to be practically immune from attack by *Rhabdocnemis obscura*, Boisd., have given encouraging results. As a result of experiments with the Tachinid parasite [*Ceromasia sphenophori*], December appears a good month for its liberation, as the second brood has time to develop before the onset of the wet season and before the appearance of the fungus infesting this fly [*Empusa*].

JARVIS (E.). **Science Notes.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 1, July 1922, pp. 39–45, 1 plate.

In the Cairns district the larval stage of *Lepidoderma albohirtum*, Waterh., occurs from February to July; *Lepidiota rothei*, Blackb., from March to August; *L. frenchi*, Blackb., *L. caudata*, Blackb., and *Anoplognathus boisduvali*, Boisd., at all times; and *Dasygnathus australis dejeani*, Macl., from January to May.

Scarabaeid larvae nearing the end of the second instar appear to be readily attacked by *Campsomeris*, and the readiness of these Scoliids to oviposit on hosts whether large or small would add greatly to their usefulness in other countries into which they might be introduced against root-eating Scarabaeid larvae. Contrary to former experiments it was found that *Campsomeris radula*, F., will often parasitise larvae of *D. australis dejeani*.

The author believes that under natural conditions both *C. radula* and *C. tasmaniensis*, Sauss., usually oviposit on larvae of the first suitable host they may encounter. In view of the continuous food supply furnished by various root-eating Scarabaeids and the fact that 73° F. is the average temperature during autumn and winter, *Campsomeris* spp. can produce successive generations about every three months. The first brood is derived from eggs laid at the end of September. Egg-laying is general towards the end of October and continuous into November. The adults from this brood emerge about the middle of December into January. The life-cycle occupies about 47 days, the duration of the egg, larval and intra-cocoon stages being 3, 8 and 36 days respectively. The approximate period occupied by the second brood is from the middle of December to the middle of February. From data compiled in 1917–18 the average durations of the egg and larval stages of this brood of *C. tasmaniensis* are 3½ and 7½ days respectively. The intra-cocoon stage occupies 36 days for the male and 38½ days for the female. Temperature and humidity appear to play an important part in this brood. Eggs of the third or autumn brood are laid in March and give rise to adults from May onwards. Eggs giving rise to the winter brood are laid in June or July. These require from 7 to 10 days to hatch during winter, while the period occupied by both the egg and larval stages varies from 18 to 24 days at an average shade temperature of 68° F. These stages of the summer brood occupy only 12 days at a temperature of 82° F. These four broods together represent a period of about 270 days, which extended over twelve months gives an interval of 30 days between the broods.

The eggs of *C. tasmaniensis* and *C. radula* are placed singly in the mid-ventral area of the third or fourth abdominal segments of the host larvae. When two parasites are forced to feed on one host their larval period is shortened, cocoons being spun at the end of six days. Five eggs artificially gummed to the body of one host matured except one, which was on the anal segment so that the larva died after having

imbibed juices contaminated with ingested earthy matter. When emerging from a detached egg which has fallen on the soil the larva is helpless and cannot reach its host.

In 1917–18, about 20 per cent. of the eggs of these parasites were destroyed by mites. These Rhizoglyphids are supposed to utilise the Coleopterous larvae for transport purposes and not to feed on them until decomposition has set in. The author has, however, seen them devour a fully grown larva of *C. tasmaniensis* that had been unable to spin a complete cocoon. An unknown fungus has been observed enveloping the eggs and very young larvae of *Campsomeris*, and about 5 per cent. of the eggs were destroyed in the insectary by bacterial disease during October and November.

The early stages of the hyperparasite, *Macrosiagon cucullata*, Macl., a Coleopterous parasite of *Campsomeris* spp., have already been noticed [*R.A.E.*, A, x, p. 477].

FROGGATT (J. L.). **The Banana Beetle Borer.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 1, July 1922, pp. 48–49.

After extended observations in the field, it is apparent that the banana beetle borer [*Cosmopolites sordidus*] is increasing and spreading, particularly in plantations where control measures have been neglected or insufficiently carried out. In laying out a plantation it should be certain that the source from which the suckers are being obtained is not infested, and the plantation should not be made adjacent to infested areas. Where this has already been done, precautions should be taken to prevent the weevil spreading, by laying corm baits between the two areas. Whenever practicable, infested stools should be dug out and destroyed and baits laid on the sites of the stools to prevent migration. The presence of this borer, after the egg stage, is readily detected by the larval tunnels, and the leaves of suckers show an unhealthy appearance. A brief description of all stages of this weevil is given.

ANSTEAD (R. D.) & BALLARD (E.). **Mosquito Blight of Tea.**—*Planters' Chron., Coimbatore*, xvii, nos. 30 & 31, 29th July & 5th August 1922, pp. 443–447 & 453–455.

The intensity of mosquito blight [*Helopeltis*] of tea is still increasing in Southern India. As it is an indication of unhealthiness, the bush and not the insect should be treated, the factors affecting its vigour being climate, drainage and malnutrition. The latter is largely due to loss of original top soil and consequent removal of available plant food and soil bacteria.

Reference is made to the summary of the researches by Carpenter and Andrews on the connection between the proportion of available potash to available phosphoric acid in the soil and the incidence of the pest [*R.A.E.*, A, x, 395]. A scheme of experiments to test the effect of applying continual small doses of potash under various conditions combined with drainage and lime is outlined. Similar experiments have been made in Assam, where it has been found that results do not appear until after two or three years. Spraying as a general principle is both uneconomical and impracticable under the conditions obtaining in South Indian estates, except in special cases. Hand catching is recommended where it is done systematically.

Carpenter and Andrews state that the influence of the variety of tea on the incidence of this Capsid is so slight as to be negligible [*R.A.E.*, A, vii, 534], but in Southern India this is not so, as China and China hybrids are far more susceptible to attack than other varieties.

KHARE (J. L.). **Some Citrus Pests in the Nagpur District.**—*Dept. Agric. Central Provinces, Nagpur*, Bull. 10, 1921, 14 pp., 10 plates. [Received 22nd August 1922.]

A brief account is given of the life-history, habits and food-plants of the following citrus pests: *Papilio demoleus*, L.; *P. polytes*, L. (lemon butterfly); *Phyllocnistis citrella*, Stn. (orange leaf-miner); *Tonica zizyphi*, Stn. (orange leaf caterpillar); *Tarucus theophrastus*, F. (orange hairstreak); *Arbela quadrinotata*, Wlk. (orange stem borer); *Stromatium barbatum*, F. (orange longicorn); *Ophideres* sp. (orange fruit borer); *Odontotermes obesus*, Ramb.; *Toxoptera aurantii*, Boy. (orange aphis); *Euphalerus citri*, Kuw. (orange psylla), and *Dialeurodes citri*, Ashm. (orange mealybug).

[**Legislation against** *Iridomyrmex humilis*.]—*Riv. Agric., Parma*, xxvii, no. 33, 18th August 1922, p. 495.

The Italian Ministry of Agriculture has issued a decree dated 27th May 1922 making measures against the Argentine ant, *Iridomyrmex humilis*, Mayr, compulsory.

ROLET (A.). **Les Parasites de la Mouche de l'Olive et l'Olivier espagnol Arbequina.**—*Bull. Agric. Algérie-Tun.-Maroc, Algiers*, xxviii, no. 2, February 1922, pp. 61–63. [Received 22nd August 1922.]

At the Olive Growers' Congress at Nice, M. Poutiers stated that of the various parasites of *Dacus oleae*, *Opius concolor*, a Tunisian species introduced into the south of France, appears to be the most promising.

In Tunisia it has no other host than *D. oleae*, except that when the latter is lacking it parasitises a Trypetid infesting *Zizyphus*. In Tunisia the harvested olives are stored until the crushing time, a circumstance very favourable to *O. concolor*. Other pests of the olive in Tunisia include *Phloeotribus scarabaeoides* (*oleae*) and the olive moth, *Prays oleellus*; the latter is parasitised by a Chalcid, *Ageniaspis fuscicollis*.

ALTSON (A. M.). **Beetles damaging seasoned Timber, with an Account of their Ravages and the Methods of Treatment.**—*London*, W. Rider & Son, Ltd., 1922, 24 pp., 7 figs. Price 2*s*. 6*d*.

This paper is reprinted from the *Timber Trades Journal*, 15th April–13th May 1922.

The commonest timber-boring beetles in Britain are *Lyctus linearis*, Goeze, *L. brunneus*, Steph., *Anobium punctatum*, DeG., and *Xestobium rufovillosum*, DeG. An account is given of the life-history and habits of these species, and of the kinds of timber attacked. A less common Anobiid is *Ptilinus pectinicornis*, L.

The damage by these beetles can to a large extent be prevented. A regular system of inspection and classification of stocks is outlined as a preventive, and for timber stored in the open, treatment with

cold paraffin mixed in equal parts with either cedar-wood, linseed, or a heavy mineral oil, gives partial immunity from infestation ; these applications should be made from early April to September. For timber in stores and sheds, better deterrents are orthodichlorobenzene, applied with a brush or sprayer, the top layer being thoroughly wetted, or paradichlorobenzene scattered on the top of the stack or suspended in bags from the roof of the shed. Either of these is most effective at temperatures of 60° F. and upwards. Another treatment for material that is already infested is dry heat, the wood being gradually heated to 149° F., or moist heat at 158° F., the temperature being maintained in both cases for two hours for 1 in. thick material, with an additional hour for each extra inch of thickness. Fumigation in air-tight stores with hydrocyanic acid gas for 24 hours for ¾ in. thick timber is effective at normal temperature, or 1 pint of chloropicrin per 1,000 cu. ft. for 24 hours at 75° F. and upwards. Fumigation with a specially constructed plant, which has not yet been used in this country, is described ; by this method carbon bisulphide also can be used with success, while the risks attending ordinary fumigation are almost eliminated.

ROEBUCK (A.). **Experiments on Cultural Methods of Controlling Onion Fly** (*Hylemyia antiqua*, **Meigen** = *Phorbia cepetorum*, **Meade**).—*Bull. Chamber Hortic., London*, i, pt. 1, July 1922, pp. 8–10, 4 figs.

Of the various cultural methods tested for the protection of onions from *Hylemyia antiqua*, Meig., sets and transplants both from autumn sowing and sowing in heat show a marked superiority over spring sowing.

KUWANA (I.) & TANAKA (K.). **Hompô ni okeru Saboten ni kisseisuru atarashiki Kaigaramushi ni tuki.** [A new *Eriococcus* on *Cactus* from Japan.]—*Konchu Sekai* [The Insect World], xxvi, no. 299, 1922, pp. 215–221.

An interesting species of *Eriococcus*, *E. saboteneus*, sp. n., has been found by the authors on cultivated cacti in Yokohama and near Tokyo. The Coccids are always found scattered upon the surface of the stems and never in swarms, as in the case of other species of the genus. The larvae hatch most abundantly at the end of May, though hatching continues until the beginning of July. The male larva when mature migrates to the spines, where it spins a cocoon, but the female always remains upon the stem surface.

MARSHALL (G. A. K.). **On the Australian Fern Weevils.**—*Bull. Ent. Res., London*, xiii, no. 2, August 1922, pp. 169–180, 3 plates.

In the course of a study of the Australian fern weevil, *Syagrius fulvitarsis*, Pasc., undertaken by Mr. C. E. Pemberton in New South Wales, for the purpose of obtaining parasites to introduce into Hawaii for its control there, a number of other weevils were found attacking wild ferns.

These include several new species here described, namely, *Syagrius costicollis*, *S. pembertoni*, *S. squamipes*, *Neosyagrius porosus*, and *N. striatus*. A key is given to the species of *Syagrius*.

TOTHILL (J. D.). **Note regarding Types of some Tachinidae (Diptera) from India.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, p. 181.

This paper describes the disposition of the type material of the species dealt with in a previous one [*R.A.E.*, A, vi, 331].

The following notes on synonymy of the species in question are contributed by Major E. E. Austen: *Servillia transversa*, Toth. = *S. sobria*, Wlk.; *S. ursinoidea*, Toth. = *S. fulva*, Wlk.; *Gonia himalensis*, Toth. = *G. capitata*, DeG.; *Paraphania fuscipennis*, Toth. = *Orectocera beelzebub*, Wied., of which *Tachina imbrasus*, Wlk., is also a synonym; *Frontina kashmiri*, Toth., should be referred to the genus *Podomyia*; and *Lophosia excisa*, Toth., is probably a *Phania*.

WATERSTON (J.). **Two New Chalcidoid Parasites.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 183–188, 5 figs.

Descriptions are given of the Trichogrammatid, *Chaetostricha cratitia*, sp. n., from two females bred from eggs of the Hispid beetle, *Promecotheca reichei*, Baly, injurious to the foliage of the coconut, *Cocos nucifera*, in Fiji, and of *Encyrtus cotterelli*, sp. n., from three males bred from a third instar nymph of the Capsid bug, *Sahlbergella theobromae*, Dist., injurious to cacao (*Theobroma cacao*) in the Gold Coast. This species is only provisionally assigned to the genus *Encyrtus*.

MORRIS (H. M.). **The Larval and Pupal Stages of the Bibionidae. Part II.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 189–195, 1 plate, 10 figs.

This paper continues the study of the immature stages of Bibionids [*R.A.E.*, A, x, 41] and deals with *Dilophus febrilis*, L., and *D. albipennis*, Mg. These are the commonest species of the genus in Britain, and both frequently occur in great numbers. *D. febrilis* has often been recorded as damaging the roots of plants, especially hops, in the larval stage. There are apparently two generations a year, adults appearing in May, and again in smaller numbers in August and September. The eggs are laid in a mass in a cell in the soil. *D. albipennis* seems to have only one generation, which appears in May, oviposition being similar to that of *D. febrilis*. The four larval stages and the pupa of each species are described, and the differences between the larvae and pupae of *Bibio* and *Dilophus* are pointed out.

MORRIS (H. M.). **On a Method of Separating Insects and other Arthropods from Soil.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 197–200, 2 figs.

The apparatus here described consists of an outer case of galvanised iron, supporting three sieves of different mesh, that with the largest mesh being on the top, the intermediate size in the middle and the smallest below. A lead pipe fitted with a large rose with a convex face is clamped to the upper edge of the case and is connected at the other end with a water supply, for which there is an outlet at the bottom of the case. The soil to be examined is placed in the upper sieve, the water turned on and the soil thus washed into three lots in the sieves, the finest particles being carried away with the waste water and the insects being retained in the various sieves according to their size.

FULLAWAY (D. T.). **A New Hymenopterous Parasite of the Australian Fern Weevil,** *Syagrius fulvitarsis*, **Pasc.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, p. 201.

Ischiogonus syagrii, sp. n., is described from two females and two males reared from larvae of *Syagrius fulvitarsis* (Australian fern weevil) at Nimbin, New South Wales [*cf. R.A.E.*, A, ix, 517 ; x, 87].

TILLYARD (R. J.). **The Life-history of the Australian Moth-lacewing,** *Ithone fusca*, **Newman (Order Neuroptera Planipennia).**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 205–224, 2 plates, 11 figs.

A study of the life-history of *Ithone fusca*, Newm., during 1918 and 1919 has shown that the complete cycle normally requires exactly two years. The adults emerge about sundown from the end of October to mid-November, flight beginning after sunset. Swarming principally occurs on calm, warm evenings, and many natural enemies lie in wait for them and destroy vast numbers.

The length of the various stages of *I. fusca* is on an average 31 days for the egg, 1 year and 9½ months for the five larval instars, about three weeks for the larva in cocoon and another three for the pupa in cocoon, while the adults live two or three days. Pairing usually occurs within an hour or two of emergence, and most of the eggs are laid the same night. The female, having located a soft place in the sand, digs down with her abdomen and deposits from 200 to nearly 300 eggs, rolling each one separately in the sand, which adheres to its sticky surface and forms a protective covering. The larva, upon hatching, works down through the top layer of dry soil, until it reaches the zone of slight moisture where it lives. During dry weather larvae can be found from 1½ ft. to over 2 ft. below the surface, but after rain they work upwards, always keeping in the zone of slight moisture. When the larva is full-grown, it ceases to feed and penetrates to a lower level in the soil, where it hollows out an elongated oval cell and then spins a silken cocoon. The first cocoon was found on 12th September, and the earliest emergence following that date was on 30th October. The pupa apparently frees itself from the cocoon and then comes to rest at some point in the soil where the warmth of the sun is noticeable, waiting until slight cooling has taken place before it discloses the imago. The stages are described.

For a long time the food of the larvae remained undiscovered, but experiment has shown that they feed on Coleopterous larvae present in the soil, more than 90 per cent. of these being Scarabaeid grubs. The method seems to be to burrow down underneath their prey and attack it from below, sucking the victim dry. The fact that there is a remarkable resemblance between the larva of *Ithone* and the Scarabaeid grubs on which it feeds has caused the former to escape notice in the past.

Various species of Ithonids are widely distributed in Australia, and are therefore evidently capable of withstanding extremes of temperature in the soil. They are most abundant along the sandy foreshores and in light, loose soil, which is also the preferred habitat of the various species of grass grubs. As these grubs are a serious pest in many parts of the world, any addition to their natural enemies is important, and attempts have already been made to introduce *I. fusca* into New Zealand in the hope of controlling them.

UVAROV (B. P.). **Rice Grasshoppers of the Genus *Hieroglyphus* and their nearest Allies.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 225–241, 3 figs.

This paper presents a critical study of all the known species of the genus *Hieroglyphus*. These grasshoppers are well known in India as serious pests of rice, sugar-cane, *Sorghum* and other crops, *H. banian*, F., in particular being implicated. Keys are given to the three genera belonging to the group under revision, and to the species contained in them.

The new species described are *Hieroglyphodes assamensis*, gen. et sp. n., from Assam, *Hieroglyphus africanus* from Kamerun and the Sudan, and *H. banian* var. *elongata*, n., from Bengal. Species that appear to be of particular economic importance are *Parahieroglyphus bilineatus*, Bol., which has been found in small numbers associated with *H. banian* in rice-fields in India; *Hieroglyphus concolor*, Wlk., recorded as a pest of crops in India; *H. annulicornis*, Shir., said to be a pest of sugar-cane in Formosa, and also recorded as damaging *Canna indica*, but not apparently observed as a pest in India; *H. nigrorepletus*, Bol., recorded at various times as a pest of rice, *Andropogon sorghum*, *Setaria italica* and maize; *H. banian*, which attacks rice, sugar-cane, *Sorghum*, maize and *Setaria*, as well as grasses; and *H. oryzivorus*, Carl, destructive to rice and some other crops.

BUCKELL (E. R.). **Grasshopper Situation in Nicola Valley.**—*Agric. Jl., Victoria, B.C.*, vii, no. 6, August 1922, pp. 130–131 & 136, 2 figs.

The worst grasshopper outbreak in the history of British Columbia took place in 1922 in the Nicola Valley, and severe damage was done to the ranges, grain and hay crops. An account is given of previous outbreaks and of the life-history and habits of *Camnula pellucida*, Scudder (clear-winged locust), the most injurious species throughout the dry interior regions of British Columbia. At the present time the ranges over almost the whole area have been very seriously damaged, and the majority of the low winter ranges are entirely destroyed, while the grain and hay crops have been ruined. If the fungus, *Empusa grylli*, and such natural enemies as the red mite, *Eutrombidium* (*Trombidium*) *locustarum*, Walsh, do not attack the swarms, there will be a further bad outbreak in the summer of 1923, and at present climatic conditions have not favoured these controlling factors. Blister beetles are the only natural enemies that have shown a marked increase. Remedial measures are irrigation ditches and poison baits. In a cattle country dry cattle manure appears to be an excellent substitute for bran, the poison and salt water being mixed with it. Grasshopper catchers may be successfully used to supplement poison bait [*R.A.E.*, A, ix, 489].

HARNED (R. W.) & SMITH (M. R.). **Argentine Ant Control Campaigns in Mississippi.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 261–264.

The organisation of the campaigns against the Argentine ant [*Iridomyrmex humilis*, Mayr] in Mississippi, where successful results were obtained with the use of Barber's poison [*R.A.E.*, A, viii, 285], is described.

Experience shows that the eradication of this pest is quite possible, and it is hoped that it will soon receive attention from the Federal authorities in a similar manner to that given to the European corn-borer [*Pyrausta nubilalis*, Hb.] and other pests.

Howard (N. F.). **The Mexican Bean Beetle in the Southeastern U.S.** —*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 265–275, 2 figs.

Epilachna corrupta, Muls. (Mexican bean beetle) is gradually spreading in the United States, the trend of the distribution in the southeastern area being to the north. With one exception the infestation occurs in the hilly country; this exception, however, proves that the beetle is capable of thriving in flat country under extreme southern conditions.

During life-history experiments development was not observed at temperatures below 60° F., but eggs withstood 31° F. at the end of March. In northern Alabama the insect is not completely dormant during the winter. The larvae of the moths, *Prodenia ornithogalli*, Guen., *Laphygma frugiperda*, S. & A., and *Heliothis obsoleta*, F., and *Sinea diadema*, F. (diadem assassin bug) feed on the larvae and pupae of *E. corrupta* under field conditions, but are not considered of much value in natural control.

Artificial remedial measures are discussed, including arsenical sprays [*R.A.E.*, A, x, 436], dusts and cultural measures [*R.A.E.*, A, ix, 374].

Britton (W. E.). **Tobacco Plant injured by the Seed Corn Maggot.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 275–276.

Phorbia fusciceps, Zett., is recorded as injuring tobacco plants grown on a light sandy soil. The infested area had been covered with clover the preceding season and had been ploughed under in the spring. The damage was sufficient to prevent a good crop of wrapper leaf tobacco. Similar injury is recorded by W. P. Flint, to strawberry plants in Illinois.

Davis (J. J.). **Insect Problems in Indiana during 1921.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 277–282.

The mild winter of 1920–21 was one of the most important factors favouring insect development in Indiana during that season. *Hypera (Phytonomus) punctata* (clover-leaf weevil) was particularly abundant from the end of March to the end of April, after which red and English clover suffered from the attacks of *H. (P.) nigrirostris* (clover-bud worm). The latter weevil has been gradually increasing in abundance, particularly in central Indiana, and may be expected to be an annual pest.

Calcium arsenate and gypsum (1 to 20) have been extensively used against *Diabrotica vittata* (striped cucumber beetle) with satisfactory results.

The more important Aphids occurring during the season were *Anuraphis persicae-niger* (peach aphis), *Aphis gossypii* (melon aphis) and *A. houghtonensis* (gooseberry aphis).

Pulvinaria vitis (cottony maple scale) and *Lepidosaphes ulmi* (oyster shell scale) were unusually prevalent in the northern half of the State. Nicotine oleate at the rate of 1 oz. to 1 U.S. gal., or 1 oz. nicotine sulphate added to 5 U.S. gals. water containing 1 lb. fish-oil soap, was applied on 15th June, some days after the eggs had hatched. From the results it would seem that the latter is preferable to nicotine oleate for the control of immature scales such as *P. vitis*, *L. ulmi* and *Aspidiotus perniciosus*.

Macrodactylus subspinosus (rose beetle) is recorded as damaging peach, grapes, maize and rose, and in one instance the poisoning of poultry as a result of eating the beetles is reported. Creosote barriers, as recommended by Flint, and sprays [*R.A.E.*, A, x, 197] were used with success against the chinch bug [*Blissus leucopterus*]. The blister beetles, *Epicauta vittata*, *E. cinerea*, *E. marginata*, *E. pennsylvanica* and *Macrobasis unicolor* were abundant on potatoes, tomatos and other garden crops. This is apparently a logical sequence of the grasshopper outbreaks of recent years. *Lachnosterna* sp. was most abundant on maize and strawberries.

Lucerne was injured during the latter part of September by *Loxostege sticticalis* (alfalfa webworm) and *Laphygma frugiperda* (fall army worm), the latter occurring also on clover. *Heliothis* (*Chloridea*) *obsoleta* (corn-ear worm) was abundant throughout the State, both on field and sweet maize, as well as many other plants. *Alabama argillacea* (cotton caterpillar) occurred in isolated sections on apple, and was particularly injurious to strawberries in the northern part of the State. Other pests recorded are *Aegeria* (*Sanninoidea*) *exitiosa* (peach-tree borer), *Mayetiola* (*Phytophaga*) *destructor* (Hessian fly), codling moth [*Cydia pomonella*], and fruit-tree bark-beetle [*Scolytus rugulosus*]. As a result of experiments with various dormant sprays now on the market for use against *Aspidiotus perniciosus*, dry lime-sulphur is not recommended unless liquid or miscible oil is not available, when it should be used at $1\frac{1}{2}$–2 times the strength usually recommended.

HERRICK (G. W.). **The Maple Case-bearer,** *Paraclemensia acerifoliella*, **Fitch.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 282–288, 5 figs.

The Tineid, *Paraclemensia acerifoliella*, Fitch, has become so abundant in New York State during the last three years that the sugar maples in many groves are threatened with destruction. Its previous history and synonymy are reviewed. It is apparently widely distributed over the north-eastern United States and southern Canada. Although the author has only found it on sugar maple, it has been reared to maturity on red maple (*Acer rubrum*), and Fletcher records it as feeding on the leaves of beech trees growing among infested maples that had been defoliated.

In breeding-cages the moths emerged from 11th to 23rd May. In New York State they were found in abundance on 30th May 1922, and had already laid eggs. These are deposited in minute pear-shaped pockets in the tissues of the leaves just below the lower epidermis; they hatch in about a week, the larvae being found in large numbers by the 16th June ready to leave their mines. As soon as the larvae hatch they mine in the tissues of the leaf, in which they live about 10 days. The mines are mostly irregular, becoming somewhat enlarged towards the terminus. In six leaves examined the number of mines varied from 24 to 116. On completing its growth towards the end of the summer the larva cuts an oval case out of the mine. Pupation probably occurs about October. The pupae remain among the fallen foliage until the following spring, there being but one generation a year.

Raking the fallen leaves into heaps and burning them would most likely prove an effective check, the only other feasible method being thorough dusting with lead arsenate by means of an aeroplane.

Fenton (F. A.) & Ressler (I. L.). **Artificial Production of Hopperburn.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 288–295, 1 fig.

Experiments with regard to the artificial production of hopperburn are described [*R.A.E.*, A, x, 177].

Inoculations with hypodermic needles gave varying results, probably owing to some difference in procedure not noted at the time.

It is now thought that the nymphs of *Empoasca mali* contain less of the toxic substance than the adults, as the abnormalities produced by the inoculation of the crushed nymphs are less severe than when the crushed adults are used [*cf. R.A.E.*, A, ix, 247].

Fenton (F. A.) & Hartzell (A.). **Effect of Bordeaux Mixture on** *Empoasca mali*.—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 295–298.

Bordeaux mixture, 4–4–50, is decidedly repellent to the adults of *Empoasca mali* and is toxic to the nymphs; recent experiments have also shown it to be cumulative in its effects [*cf. R.A.E.*, A, ix, 31, 247; x, 354]. The addition of $1\frac{1}{4}$ pints Black-leaf 40 to every 100 gals. of spray did not materially increase its deterrent effect.

Beyer (A. H.). **Experiments on the Biology and Tipburn Disease of the Bean Leaf-hopper with Methods of Control.** (*Empoasca mali*, **Le Baron**).—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 298–302.

Biological studies were carried out in the northern portion of Florida during 1921, where an overwintering period of *Empoasca mali* was noticed, whereas in the southern part of the State there is apparently no overwintering period. All stages were taken on castor bean, and an outbreak was also recorded on garden beans (*Phaseolus vulgaris*) as early as 24th March. In the northern part of the State the earliest occurrence was on cowpeas on 20th August.

At Gainsville, in the south, the first individuals were found at the beginning of March feeding on poke weed (*Rivina humilis*). The first egg scars were found on 10th March, and the first nymphs on 18th March. A total of six generations were reared in an outdoor laboratory in 1921. The life of the adults ranged from 32 to 64 days during the summer flight and the incubation period from 5 to 9 days. Young bean plants are affected a few days after colonisation of the nymph stages on them. Hot, dry weather apparently hastens the burning of the plants, while humid weather and moist soil retard it, but neither the type of soil nor sunlight are of importance in minimising burning. The natural enemies of the leaf-hopper include spiders, a mite, the small red ant, *Dorymyrmex pyramicus*, and the fungus, *Entomophthora sphaerosperma*, which the author has succeeded in artificially cultivating and disseminating.

As the method of applying sprays for the control of *E. mali* is as important as the kind of material used, the author has devised a spraying attachment that has many advantages over the common method. It consists of a canvas-covered cylinder at least 36 in. long and 24 in. in diameter, containing an opening 8 in. wide, running the full length of the cylinder. This opening is turned downward to serve as a passage for the base of the plants as the cylinder passes over the

row. A wide angle mist nozzle is attached in the centre of the top of the cylinder directing the spray downward on to the top of the foliage and a similar nozzle is placed on each side of the 8-in. opening halfway between the ends of the cylinder. These nozzles should be adjustable so that the spray may be directed either inward into the row of plants or upward. The ends of the cylinder are enclosed with an iris curtain so that the aperture can be adjusted to the needs and size of the plants. The nozzles are attached to a common hose, which is connected with the pressure pump and sprayer tank. As the insects cannot escape from the cylinder, the majority of them are killed by direct contact of the spray or the resulting fumes. The apparatus is adaptable and may be used on the smallest plants; it also ensures maximum efficiency of the material applied. With a power traction sprayer it can be operated by one man, and an acre may be sprayed in an hour. Owing to the dry season six applications were made at intervals of about a week, using a pressure of 200 lb. Nicotine sulphate, 1 : 1,000, and whale-oil soap, 1 lb., gave the best results; Bordeaux mixture, 4-4-50, and nicotine sulphate, 1 : 800, giving the next best.

LEACH (B. R.) & BRINLEY (F. J.). U.S. Bur. Ent. **Experiments with Contact Insecticides for the Control of the Japanese Beetle** (*Popillia japonica*).—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 302–305.

The results of these experiments with various soap solutions indicate that the type of soap is not as important as is the concentration of the spray solution, though certain types of soap are better adapted to this purpose than others. Laundry, resin-fish-oil and fish-oil soaps are not recommended for this purpose. The efficiency of sodium and potassium soaps is in proportion to the concentration of the spray solution. Sodium soy-bean soap, 10 lb. to 50 U.S. gals. water, killed 90 per cent. of the insects in warm weather. The temperature is the limiting factor in the use of this, the best results being obtained when the beetles are exposed to the sun during the heat of the day. A coarse nozzle should be used with sufficient pressure to wet the foliage thoroughly.

Many other substances were tried alone and in combination with this soap, but the latter is apparently the only active material, and its efficiency is not increased by the addition of others.

These experiments on *Popillia japonica* were carried out also with *Macrodactylus subspinosus* (rose beetle), the results being substantially the same.

SMITH (L. B.). **Larval Food Habits of the Japanese Beetle** (*Popillia japonica*, **Newm.**).—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, pp. 305–310.

Recent observations show that the larvae of *Popillia japonica* feed in the spring and early autumn, chiefly on living plant tissue [*cf. R.A.E.*, A, x, 303]. An analysis of the contents of the fore intestine showed this substance to constitute about 67·33 per cent. by weight of the total material eaten. When the larvae are feeding they occur at depths varying from ½ to 3 in. in the soil. They will attack the roots of many ornamental shrubs and plants, as well as those of maize, beans and tomatos. Many weeds and coarse-rooted grasses do not show any appreciable effects from the attacks of the larvae, but the finer-rooted species such

as blue grass and red top are killed. The injury is particularly noticeable on putting greens, where, besides the direct injury to the grass roots, the playing surface is rendered soft and spongy by the burrowing of the insects in the soil.

The larvae are positively thigmotropic [responsive to touch] to living roots, and, failing these, to stones, sticks or the bottom and sides of breeding cages.

FROST (S. W.). *Eulia mariana*, **Fernald, a new Apple Feeder in Pennsylvania and some related Forms on Apple.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, pp. 310–311.

Eulia mariana, Fern., has been repeatedly found feeding on the foliage and fruit of apple in Pennsylvania, though it is not as abundant as *E. velutinana*, Wlk., which is even a more serious pest than was at first thought. It has now been found that this latter moth passes the winter in the pupal stage [*cf. R.A.E.*, A, ix, 119] and that there are three complete generations. The larvae of the two species are similar in habits; the majority of *E. mariana* passes the winter in the pupal stage, the adults emerging in spring and laying their eggs in masses on the trunks and larger branches of the trees.

E. quadrifasciana, Fern., a pest of apples in New York, is probably generally distributed throughout the north-eastern United States, but has not yet been recorded as injurious in Pennsylvania.

B[RITTON] (W. E.). **The European Nitidulid Beetle.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, p. 311.

Heterostomus pulicarius, L., has been very injurious to strawberry plantations in Columbia County, and has also been present in other counties in New York State. Individuals have also been collected near Boston and in Connecticut during 1921.

B[RITTON] (W. E.). **The Anomalas collected at New Haven, Conn., in 1920–21.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, pp. 311–312.

Beetles collected on grass and weeds in Connecticut have been identified as *Anomala orientalis*, Waterh., a native of Japan. In Hawaii, where this species has caused considerable damage to sugar-cane, its numbers have been greatly reduced by the introduction of parasites.

BAKER (A. C.). U.S. Bur. Ent. **Feeding Punctures of Insects.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, p. 312.

Although the feeding of *Trialeurodes vaporariorum*, West., does not injure the mesophyll cells, they become enlarged, oedematous and devoid of choroplasts as a result of the reaction of the setal secretion deposited by this whitefly. The reaction apparently varies in different species and different food-plants. As this species in most cases selects the soft bast of the vascular bundle, it should be grouped with the commoner Aphids as to tissue selection, and not with such forms as red spider, which feed on the contents of the epidermal cells or a few cells immediately underlying them.

SEVERIN (H. H. P.). **Sea Coast Flea Beetle** (*Disonycha maritima*, **Mann.) injurious to Sugar Beets in Sacramento Valley, California.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, p. 312.

During May of 1919 and 1920 *Disonycha maritima*, Mann., was very abundant on certain beet fields in California, causing injury by feeding on the foliage and gnawing holes in the roots. By the end of June no adults could be found.

WOLCOTT (G. N.). **The Distribution of the Pink Bollworm of Cotton,** *Pectinophora gossypiella*, **Saunders, in Porto Rico.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, pp. 313-314, 1 map.

Soon after the first discovery of *Platyedra* (*Pectinophora*) *gossypiella*, Saund., in Porto Rico in July 1921, it was found throughout the cotton-growing section of the island. An account is given of the distribution of this moth as ascertained by a survey made during the winter and spring of 1922.

WELLHOUSE (W. H.). **The Apple Red Bug** (*Heterocordylus malinus*, **Reut.**).—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 4, August 1922, p. 318.

The author considers *Crataegus* to be the preferred and probably the original food-plant of *Heterocordylus malinus*, Reut.

SEVERIN (H. H. P.). **Infective Beet Leafhoppers** (*Eutettix tenella*, **Baker) do not transmit Curly Leaf daily.**—*Jl. Econ. Ent., Geneva, N. Y.*, xv, no. 4, August 1922, p. 318.

From the experiments described it is evident that individuals of *Eutettix tenella*, Baker, that have completed all the nymphal instars on infected beet do not transmit curly leaf daily.

WOLCOTT (G. N.). **El Minador de las Hojas del Café,** *Leucoptera coffeella*, **Stain.** [The Coffee Leaf-miner, *L. coffeella*.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 52, October 1921, 12 pp., 6 figs. [Received 23rd August 1922.]

In Porto Rico the most common parasite of the leaf-mining larva of *Leucoptera coffeella*, Stn., is *Chrysocharis livida*, Ashm., *Zagrammosoma multilineata*, Ashm., being scarcer. In Cuba an emulsion of 1 part whale-oil soap and 1 part petroleum in 8 parts water has been used against the larvae and pupae, and also a less costly nicotine spray, such as Black-leaf 40. In Cuba, dry weather has been found to decrease infestation. For Porto Rican conditions this action of the weather in conjunction with that of the natural enemies mentioned must be relied upon under ordinary circumstances. Manuring to promote a vigorous growth and spraying with nicotine are exceptional measures.

WOLCOTT (G. N.) & SEÍN Jr. (F.). **Los Caculos cornudos, o los Escarabajos Rinocerontes de Puerto Rico.** [The Rhinoceros Beetles of Porto Rico.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 58, 1922, 12 pp., 4 plates.

This is a résumé of a paper by E. G. Smyth [*R.A.E.*, A, ix, 573].

WOLCOTT (G. N.), MARE (J. D.) & SEÍN Jr. (F.). **La Oruga rosada de la Cápsula del Algodón en Puerto Rico.** [The Pink Bollworm of Cotton in Porto Rico.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 63, October 1921, 12 pp., 4 figs. [Received 23rd August 1922.]

The presence of *Platyedra* (*Pectinophora*) *gossypiella*, Saund., in Porto Rico was ascertained in July 1921. The bollworm now occurs in various parts of the island, infesting the bolls of okra [*Hibiscus esculentus*], as well as those of cotton. Brief notes on the life-history and habits of this pest are given, together with simple directions as to the measures to be taken by cotton growers.

Emploi des Arsenicaux en Agriculture.—*Bull. Soc. Agric. France, Paris*, liv, no. 8, August 1922, p. 255.

By a decree of 7th July 1922, the use of insoluble arsenicals in agriculture is authorised for certain periods on certain specified plants.

Le Doryphora [*Leptinotarsa decemlineata*] **de la Pomme de Terre.**—*Bull. Soc. Agric. France, Paris*, liv, no. 8, August 1922, pp. 250–252.

The Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has recently appeared in Gironde, the infestation covering an area of nearly 100 sq. miles. Under the Ministry of Agriculture prompt measures have been taken, and arsenical treatment is to be given immediately, not only on the infested area, but also for some distance around it, a sum of about £20,000 at par having been set aside for this purpose. Any fresh infestation is to be notified at once to the Mayor of the district. By regulations published in the *Journel Officiel* of 14th July 1922, no potatoes, leaves, débris or packing of this plant are to be imported from the United States, and the prohibition extends to any other fruit or vegetable on which the potato beetle is found on its entry into France. The organisation of defensive and remedial measures against the pest is outlined, and transport from infested into non-infested areas is extensively restricted. By a decree of 7th July 1922, the use of insoluble arsenical poisons on potatoes is permitted up to one week before they are taken up.

The Destructive Insects and Pests Order of 1922.—*Statutory Rules and Orders, 1922, no. 583, H.M. Stationery Office, London*, 31st May 1922.

In this Order, which came into operation in England on 1st July 1922, and which revokes the Order of 1921 [*R.A.E.*, A, ix, 486], no change is made in the regulations in force, but instructions are given as to the certificate of inspection required with all consignments of materials included in the Order. No change is made in the insect pests against which the legislation is directed.

The Destructive Insects and Pests (Scotland) Order of 1922.—*Statutory Rules and Orders, 1922, no. 640/S.33, H.M. Stationery Office, London*, 23rd June, 1922.

By this Order, coming into operation on 1st August 1922, the above-mentioned legislation is made applicable to Scotland.

LICHTENSTEIN (J. L.). **Le Doryphore ou Chrysomèle de la Pomme de Terre** (*Leptinotarsa decemlineata*, **Say.**)—*Progrès Agric. & Vitic., Montpellier*, lxxviii, nos. 33 & 34, 13th & 20th August 1922, pp. 158–163 & 183–189.

In view of the appearance of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in the south-west of France, an account is given of this pest as occurring in the United States, from which it has evidently been introduced. The remedies in use in America are quoted, but it is pointed out that in Europe, where the beetle is not indigenous, the campaign against it must be on different lines, and the preliminary legislative measures that have been taken to stamp out the infestation and prevent its spread are outlined [*cf. R.A.E.*, A, x, 536].

PAILLOT (A.). **La Fausse Chenille du Pêcher.**—*Rev. Hortic. Algérie, Algiers*, xxvi, no. 6, June–July 1922, pp. 110–112.

The peach orchards in the Rhône Valley are being very badly damaged by a sawfly, *Neurotoma (Lyda) nemoralis*. This pest has not hitherto been noticed in that region, but it is present to an extent that will be disastrous if the infestation is allowed to spread. Cherries, apricots and almonds are also attacked. The adults began to fly about 9th May in 1921, the maximum flight being on the 11th. Pairing and oviposition began soon afterwards, the females depositing an average of 60–70 eggs each in masses on the lower surface of the tender leaves at the tips of the branches. The larvae hatch in 6–8 days and feed upon the leaves, after having folded them over with a silken thread. After feeding for about a fortnight they enter the ground for pupation, remaining in the pupal cells through the winter. Neither heat, cold, nor drought seems to have any effect on the vitality of the larvae.

The only treatment found to be effective was spraying with nicotine or quassia. For the former, 20 lb. of black soap should be dissolved in 10 or 12 gallons of boiling water and allowed to cool, 1½ gals. of nicotine titrated at about 10 per cent., or one-fifth of that quantity titrated at about 50 per cent., should then be added and the whole brought to 100 gals. For the latter, a decoction should be made of 10 lb. quassia chips in about 10 gals. of water; this should be kept hot for two hours and then allowed to cool; in a few gallons of water, 20 lb. of black soap should be dissolved, and the quassia decoction should then be added to this and the whole brought to 100 gals. The first application of either spray should be made when oviposition is noticed, followed by another application about four days later if the eggs are very numerous. A knapsack sprayer should be used, the lower surface of each leaf being thoroughly wetted.

SCH. BR. **Reblausbekämpfung und Rekonstruktion im Kanton Waadt.** [Vine Louse Control and Vine Replanting in the Canton of Vaud.]—*Schweiz. Zeitschr. Obst- u. Weinbau, Frauenfeld*, xxxi, no. 17, 26th August 1922, pp. 265–267.

The vineyard area in the Swiss Canton of Vaud decreased from about 16,550 acres in 1886 to about 10,900 in 1921 as a result of infestation by *Phylloxera*. The vineyards are now divided into three classes: those in which measures have been abandoned, those in which the infestation is combated after the vintage, and those in which measures are energetically applied immediately a centre of infestation is observed. About 3,160

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acres have been replanted with grafted vines, an area nearly four times as great as that compulsorily uprooted. During the 26 years in question the authorities have disbursed over £200,000 at par in fighting this pest.

MUTCHLER (A. J.) & WEISS (H. B.). **Wood-boring Beetles of the Genus *Agrilus* known to occur in New Jersey.**—*New Jersey State Dept. Agric., Bur. Statistics & Inspection, Trenton, N.J.*, Circ. 48, April 1922, 20 pp., 1 plate, 9 figs.

A key to the species of the genus *Agrilus* is given, together with brief accounts of twenty-two species that are likely to be found in New Jersey nurseries.

The more important are *A. anxius*, Gory (bronze birch borer) on birch, poplars, cottonwoods and aspens; *A. arcuatus*, Say (oak twig-girdler), reared from black oak (*Quercus velutina*), beech (*Fagus americana*) and hickory (*Hicoria ovata*); *A. bilineatus*, Web. (two-lined chestnut borer) on oak and chestnut; *A. politus*, Say, on willow, hazel, oak and other trees; *A. ruficollis*, F. (red-necked cane borer) on blackberry and raspberry; *A. sinuatus*, Oliv. (sinuate pear borer) in sapwood of pear and *Crataegus* sp.; *A. subcinctus*, Gory, on poison ivy; *A. viridis*, L., var. *fagi*, Ratz. (rose stem-girdler), which occasionally does considerable damage to *Rosa rugosa* and standard roses; and *A. vittaticollis*, Rand. (apple root borer) on shadberry (*Amelanchier canadensis*), thorn, choke cherry, and *Oxydendrum* sp. The larvae of the last named attack apple, pear, wild thorn, wild crab and service tree. They bore through the sap and heartwood of the roots and lower part of the trunk of apple, the burrows extending outward for several feet, and may live in the tree for nearly two years.

MOZNETTE (G. F.). **Insects injurious to the Mango in Florida and how to combat them.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1257, February 1922, 22 pp., 11 figs. [Received 28th August 1922.]

Brief descriptions are given of the principal pests of mango in Florida, with their life-histories and remedial measures for them. The mite, *Tetranychus yothersi*, McG., feeds on the upper surface of the leaves in the dry, winter months, particularly between November and March. When the mites are present in considerable numbers and the foliage is still green, sulphur dust or lime-sulphur solution at the rate of 1 gal. of the concentrate to 60 gals. water should be applied. With lime-sulphur solution, 1 gal. of the concentrate to 75 gals. water is advisable during winter if the temperature is above the normal and if the trees do not attain a thoroughly dormant condition. *Heliothrips rubrocinctus*, Giard (red-banded thrips) feeds on the lower surfaces of the leaves. In Florida the life-cycle is greatly influenced by temperature conditions. During the late summer and autumn the life-cycle requires 25 days as a minimum, and in January and February 35 days. There may be 10–12 generations a year. The lower surfaces of the leaves should be sprayed before they turn brown with 1 part 40 per cent. nicotine sulphate to 900 parts water, adding fish-oil soap to the diluted mixture to make it spread evenly. When *T. yothersi* is present at the same time the nicotine sulphate may be added to the lime-sulphur spray, the nicotine being used at the strengths given above, but the soap being omitted. *Chrysomphalus aonidum*, L. (Florida red scale) infests both the leaves and the fruit. *Leucaspis indica*, Marl. (mango scale) is found

on the limbs and trunks of the trees, and *Ceroplastes floridensis*, Comst. (Florida wax scale) on the leaves. The oil emulsions recommended for *Coccus acuminatus* [*R.A.E.*, A., x, 188] may be used against these latter. For a heavy infestation of *Chrysomphalus aonidum* two or three sprayings may be necessary, the second being applied three to four weeks after the first. The life-histories of, and remedial measures for, the beetle, *Anomala undulata*, Mels., *Coccus acuminatus*, Sign. (mango shield scale) and *Eucalymnatus tessellatus*, Sign. (tessellated scale) have already been noticed [*R.A.E.*, A, viii, 383 ; x, 188].

The most serious pests of mango in foreign countries, which should be kept out of the United States, are *Dacus ferrugineus*, F. (*Bactrocera tryoni*, Froggatt), *Anastrepha ludens*, Lw., *A. fraterculus*, Wied., *Idiocerus atkinsoni*, Leth., and *Cryptorrhynchus* (*Sternochetus*) *mangiferae*, F.

McDonald (R. E.) & Scholl (G. J.). **Disinfecting Cotton Seed to prevent the Spread of the Pink Bollworm.**—*Texas Dept. Agric., Austin*, Bull. 71, July–August 1922, 38 pp., 16 figs.

The methods of heating cotton seed for the control of the pink bollworm of cotton [*Platyedra gossypiella*, Saund.] that have been found so successful in Egypt have not answered equally well in Texas owing to differences in the nature of the seed ; moreover, the purpose in Texas is rather to prevent the spread of the pest than to control an infestation already there, and therefore it has been necessary to evolve a rather different process. A number of experiments are detailed that have been made for determining the thermal death-point of the bollworms outside cotton seed by using hot air and hot water, the thermal death-point of the bollworms in cotton seed, and the temperature injurious to the seed as regards germination, oil content and keeping qualities. Specifications of disinfecting machinery are given in full, with illustrations and warnings against types of machine that are of doubtful value. As a result it has been found that the seed must be subjected to a higher temperature than that which is to be obtained at the exit of the machine. All seed masses must be broken up and each individual seed must come into contact with the heating medium. Cotton seed uniformly heated to 145° F., with 3½ minutes' exposure, will be freed from all living bollworms, while it may be heated to 165° F. without injury to germination. Disinfecting machinery should be equipped with reliable heat control apparatus and a good recording thermometer.

Hutson (J. C.). **The Coconut Caterpillar** (*Nephantis serinopa*).—*Trop. Agric., Peradeniya*, lix, no. 1, July 1922, pp. 21–24, 12 figs.

Nephantis serinopa has been established for many years in Ceylon, but is not known to occur in inland plantations. It has recently been declared a pest [*R.A.E.*, A, x, 130]. A description is given of all stages. The eggs are laid on the lower surfaces of the leaves or under the webbed galleries made by the larvae. One female can lay more than 350 in her lifetime of two weeks. The eggs hatch in ten days, and the larvae eat the lower surface of the leaves ; they pupate in from six to eight weeks, this stage lasting about two weeks. If the first brood is a small one, the damage is usually slight. If there have not been sufficient parasites to check this brood, the second is usually much larger and unless remedial measures are adopted it will increase very rapidly. All the lower fronds dry up, and the nuts may be also

attacked, but healthy palms usually recover. This moth also feeds on the leaves of palmyra palms [*Borassus*] found on uncultivated lands.

Remedial measures include the use of light traps. These consist of an oil lamp placed in the middle of a flat shallow pan at least 24 in. across and raised about 5 ft. off the ground, and should contain water and some kerosene or coconut oil. At least three should be used to the acre at the beginning of an outbreak, except on wet nights and in bright moonlight. Bright fires are only useful if made of infested coconut leaves. They are not recommended for general use at night unless the infested leaves cut during the day are burnt. Smoky fires of tar and sulphur are of no real value. Spraying is not recommended at present. All infested leaves or parts of leaves should be cut off and burnt within 12 hours of removal. Palms should be kept healthy by cultivation and manuring, and remedial measures should be adopted directly the pest is observed.

[Jepson (F. P.).] **Investigations into Shot-hole Borer of Tea.**—*Trop. Agric., Peradeniya,* lix, no. 1, July 1922, pp. 24–27.

From manurial experiments it has been found that sulphate of ammonia and nitrate of soda and, to a less extent, lime have had some beneficial effect in reducing attacks of the shot-hole borer of tea [*Xyleborus fornicatus*]. A second series of experiments was begun to ascertain the effects of a good general manure mixture at varying rates per acre and whether liberal manuring in any way promoted the progress of the healing of gallery-entrances. These are described and are still in progress. It is suggested that further experiments with individual manures should be commenced as soon as possible to confirm the results obtained.

Morstatt (H.). **Ein neues Naturgesetz in der Biologie.** [A new Natural Law in Biology.]—Reprint, 2 pp., from *Kosmos, Stuttgart,* 1922. no. 5.

This is a brief exposition of the Hopkins bioclimatic law [*R.A.E.*, A, viii, 87, 278, etc.].

Morstatt (H.). **Bibliographie der Pflanzenschutzliteratur. Das Jahr 1921.** [A Bibliography of Plant Protection Literature in 1921.]—*Biol. Reichsanst. Land- u. Forstwirtschaft, Berlin,* 1922, 198 pp.

This issue is larger than that of the preceding year [*R.A.E.*, A, ix, 445] owing to the increased number of foreign periodicals available. The German periodicals numbered about 180, practically all the German literature of importance, especially on the agricultural side, being noticed.

Hustache (A.). **Synonymie et Dispersion de** *Pantomorus godmani*, **Crotch. (Col. Curculionidae.)**—*Bull. Soc. Ent. France, Paris,* 1922, no. 8, pp. 100–101.

Attention is called to the fact that the correct name of the rose weevil known as *Pantomorus fulleri*, Horn, is *P. godmani*, Crotch.

CHAMPION (G. C.). **The Synonymy and Distribution of *Pantomorus godmani*, Crotch, a cosmopolitan Weevil attacking Roses, Greenhouse Plants, etc.**—*Ent. Mthly. Mag., London*, no. 698, July 1922, pp. 161–162.

This note confirms the synonymy discussed by Hustache in the preceding paper and further points out that *Pantomorus godmani*, Crotch, was first described from the Azores in 1866. It seems to be gradually spreading into widely distant regions, but it is certainly of American origin and is a common pest in the United States.

WALKER (J. J.). **An American Scarabaeid in Dried Fruit.**—*Ent. Mthly. Mag., London*, no. 698, July 1922, p. 162.

Psammobius batesi, Arrow, is recorded from dried apricots probably imported from California. Its occurrence in this fruit may be accidental. *P. parvulus*, Chevr., has been recorded from the West Indies.

WATERSTON (J.). **A Chalcid Parasite of *Lecanopsis formicarum*, Newstead.**—*Ent. Mthly. Mag., London*, no. 698, July 1922, p. 163.

Choreia inepta, Dalm., is recorded as parasitising the Coccid, *Lecanopsis formicarum*, Newst., at Camberley. This Chalcid has a wide range from Sweden to Austria and westwards into Spain.

LAING (F.). **Three Species of Aphids new to Britain.**—*Ent. Mthly. Mag., London*, no. 698, July 1922, p. 164.

The species recorded are *Amphorophora rhinanthi*, Schout., on *Rhinanthus crista-galli* from the north-east of Scotland; *Pentalonia nigronervosa*, Coq., on *Alpina rafflesiana* under glass at Kew; and *Hamamelistes betulae*, Mordv. (previously recorded by Rymer Roberts as *H. tullgreni*, de Meij.) on birch trees in Surrey.

GREEN (E. E.). **The Coccidae of Ceylon. Part V.**—*London*, Dulau & Co., Ltd., 1922, pp. 345–472, 74 plates.

The concluding part of this valuable work deals with six further subfamilies of the COCCIDAE of Ceylon, viz.: ERIOCOCCINAE, with 6 new species; DACTYLOPIINAE, with 15 new species and 3 new genera, *Pseudantonina*, *Pedronia* and *Erioides*; TACHARDIINAE, with 1 new species; ORTHEZIINAE; MARGARODINAE; and MONOPHLEBINAE, with 5 new species and 2 new genera, *Labioproctus* and *Nietnera*. Keys are given to the genera and species of each subfamily. Among the new species with food-plants of economic importance is *Pseudococcus citriculus* on orange.

In a series of appendices are a number of corrections, emendations and additions necessitated by further knowledge gained since the earlier parts were published (1896–1909), with a list of species newly recorded and of new species described since those dates. An index is given to the genera and species dealt with throughout the monograph.

AUSTEN (E. E.). **Two Additions to the List of British Tachinidae (Diptera).**—*Ent. Mthly. Mag., London*, no. 699, August 1922, pp. 182–183.

The Tachinid, *Billaea irrorata*, Mg., is recorded from Kent and Surrey. Its distribution appears to be somewhat local, and it does not necessarily occur wherever its host, *Saperda populnea*, L., is found. Pupation takes place in the tunnel in the branch made by the host.

LAING (F.). *Chaetocnema* **sp. injuring Wheat.**—*Ent. Mthly. Mag., London*, no. 699, August 1922, pp. 191.

A species of *Chaetocnema* was found to be damaging wheat in Devon in June 1922. This is apparently the first record of a Halticid of this genus causing such injury in Britain, though *C. aridula*, Gyll., is stated to attack oats in France, and both this species and *C. hortensis*, Geoffr., have been recorded from Russia on cereals.

LAING (F.). **An Eastern Species of Galleridae imported into Britain.**—*Ent. Mthly. Mag., London*, no. 699, August 1922, p. 191.

Aphomia gularis, Zell., originally described from Japan, has been recorded from China, Vladivostok, India and the United States of America, and has now been bred in England from a consignment of infested walnuts from Marseilles. The cocoons were made in holes bored by the larvae in the wood of the boxes containing the nuts.

LAING (F.). *Phylloxera salicis*, **Licht., a Species of Aphid new to Britain.**—*Ent. Mthly. Mag., London*, no. 699, August 1922, p. 191.

Phylloxera salicis, Licht., recorded from France, Italy and Germany, has now been found under the bark of willow in Norfolk.

WINN-SAMPSON (F.). **Previously undescribed Scolytidae and Platypodidae from the Indian Area.**—*Ann. Mag. Nat. Hist., London*, ix, no. 55, July 1922, pp. 145–152.

The species dealt with include: *Crossotarsus errans*, sp. n., from Burma, in *Careya arborea*; *Platypus decens*, sp. n., from Assam, in sal (*Shorea robusta*); *Trogloditica trahax*, gen. et sp. n., from Siam; *Webbia trigintispinatus*, sp. n., from Burma; *W. vigintisexspinatus*, sp. n., from Burma; *W. pabo*, sp. n., from India, in sal; *Sphaerotrypes quatuortuberculatus*, sp. n., from Assam, in *Drimycarpus racemosus*; and *Xyleborus perparvus*, sp. n., from Bengal.

CUNNINGHAM (G. H.). **The Genus** *Cordyceps* **in New Zealand.**
MYERS (J. G.). **Special Entomological Notes on the Hosts.**—*Trans. & Proc. N.Z. Inst., Wellington*, liii, 1921, pp. 372–382, 4 plates, 8 figs.

The nature, distribution and biology of the insect-infesting fungi of the genus *Cordyceps* are reviewed, and descriptions are given of the following species: *C. sinclairi*, Berk., infesting *Melampsalta cingulata*, F., and *M. cruentata*, F.; *C. craigi*, Lloyd, infesting *Porina enysii*, Butl.; *C. consumpta*, sp. n., infesting *Porina* sp.; *C. robertsi*, Hook., infesting *P. enysii* and *P. dinodes*, Meyr.; and *C. aemonae*, Lloyd, from the larva of *Aemona hirta*, F.

Hill (G. F.). **Descriptions and Biology of some North Australian Termites.**—*Proc. Linn. Soc. N.S.W. 1922, Sydney*, xlvii, pt. 2, no. 186, 1922, pp. 142–160, 3 plates, 41 figs.

The new species dealt with are *Eutermes vernoni*, the termitaria of which are found in large numbers on the low treeless or nearly treeless country in the vicinity of Townsville; *E. palmerstoni*, previously recorded by the author as *Eutermes triodiae*, Frogg.; *E. mareebensis*; and *Hamitermes darwini*. *H. wilsoni*, n. n., is proposed for *H. perplexus*, Hill [*R.A.E.*, A, x, 216], as this name has already been proposed by Banks in 1920 for a species from Texas.

Chamberlin (W. J.). **A Review of the Genus *Poecilonota* as found in America North of Mexico (Coleoptera, Family Buprestidae) with Descriptions of New Species.**—*Jl. N. Y. Ent. Soc., Lancaster, Pa.*, xxx, no. 1, March 1922, pp. 52–65, 3 plates.

Of the 13 species belonging to the genus here dealt with, two are new and one is a new variety. The larvae are all wood borers and confine their attack to trees belonging to the genus *Salix* and *Populus*.

Chamberlin (W. J.). **A New Lepidopterous Enemy of Yellow Pine in Oregon.**—*Jl. N. Y. Ent. Soc., Lancaster, Pa.*, xxx, no. 1, March 1922, pp. 69–71.

The Saturniid, *Coloradia pandora*, Blake, is redescribed. This moth is recorded from south Oregon, where the infestation is spreading and great damage is being done to yellow pine (*Pinus ponderosa*). Trees defoliated in 1919 showed a very sparse crop of short light green needles in 1920. A second defoliation will most probably cause the death of such trees either directly or by facilitating attack by *Dendroctonus brevicomis*.

The eggs of *C. pandora* are laid over a period of two to three weeks in July. The larvae appear at the end of August; they are voracious feeders and rapidly defoliate the trees. Adults emerge in late June and early July, the total life-cycle probably covering a period of two years.

The larvae would undoubtedly succumb to any ordinary poison spray, but the expense entailed would only be justifiable on co-operative lines to prevent the further spread of the moth; it is, however, suggested that the present limited area of infestation might be cleared at a moderate cost.

Gowanlock (J. N.). **The Periodical Cicada.**—*Science, Garrison, N.Y.*, N.S., lvi, no. 1440, 4th August 1922, p. 144.

In accordance with expectation, brood xiii of *Tibicen* (*Tibicina*) *septemdecim* (periodical cicada) appeared in the Chicago area in 1922. Larvae were first noticed on the 29th April and the first adults emerged on the 28th May. The precision of the appearance of this brood over a period of 70 years is an interesting instance of the uniformity of development under natural conditions.

McKay (M. B.). **Occurrence of *Tylenchus dipsaci* on Alfalfa in Oregon.**—*Phytopathology, Lancaster, Pa.*, xii, no. 2, February 1922, p. 105.

Tylenchus dipsaci, Kühn, caused serious injury to lucerne in Oregon in 1921. It was found to be readily transferable by inoculation to clover, to which it caused typical injury. It occurs in Oregon on clover and strawberries, and does damage in both irrigated and non-irrigated regions.

Poole (R. F.). **Celery Mosaic.**—*Phytopathology, Lancaster, Pa.*, xii, no. 3, March 1922, pp. 151–154, 1 plate, 1 fig.

The mosaic disease described, which occurred in 1921 on celery in New Jersey, was possibly transmitted from adjacent tomato plants. *Myzus persicae* was a common Aphid on the celery plants, and the disease has been experimentally transmitted by it.

Eyer (J. R.). **Notes on the Etiology and Specificity of the Potato Tip Burn produced by *Empoasca mali*, Le Baron.**—*Phytopathology, Lancaster, Pa.*, xii, no. 4, April 1922, pp. 181–184.

The results of these observations show that the substance producing tipburn is specific and cannot be simulated by inoculations with extracts from, or by direct feeding of, insects other than *Empoasca mali*, or by mechanical injury. The active principle is most virulent in the nymphal stage. The absence of sunlight does not prevent the disease, though it may inhibit its progress.

Rand (F. V.). **Insects as Disseminators of Plant Diseases. I. Results of Past Investigations.**—*Phytopathology, Lancaster, Pa.*, xii, no. 5, May 1922, pp. 225–228.

The first demonstration of insect dissemination of any disease was given in 1891, when Waite showed that fireblight [*Bacillus amylovorus*] of pomaceous fruit trees was brought about almost exclusively by the agency of insects. Subsequent observations along these lines are reviewed, the results of which show that there are 16 or 17 bacterial diseases and about 40 fungous diseases in which insects play a part. In the case of the mosaic group of diseases, insect transmission has been demonstrated for over 59 hosts.

Ball (E. D.). **Insects as Disseminators of Plant Diseases. II. Systematic Relations of Carriers.**—*Phytopathology, Lancaster, Pa.*, xii, no. 5, May 1922, pp. 229–231.

The various methods by which plant diseases may be disseminated by insects are discussed, instances being given of transmission both accidental and otherwise.

Caesar (L.). **Insects as Disseminators of Plant Diseases. III. Control Problems.**—*Phytopathology, Lancaster, Pa.*, xii, no. 5, May 1922, pp. 231–233.

The general recommendations for the control of plant diseases carried by insects, as outlined by many investigators, require the prompt destruction of all plants showing symptoms of infection, of any weeds

likely to harbour the disease, of all remnants of the crop after harvest, and of insect disseminators, the use of clean seed and tubers, and where possible, the selection of immune varieties.

Attention is called to the various difficulties encountered in attempting to carry out these recommendations, particularly with regard to the destruction of insect carriers such as Aphids. In this connection the need for a cheap contact insecticide for these and other sucking insects is pointed out.

GARDNER (M. W.). **Insects as Disseminators of Plant Diseases. IV. Urgent Problems of the Future.**—*Phytopathology, Lancaster, Pa.*, xii, no. 5, May 1922, pp. 233–240.

The opinions of a number of mycologists and entomologists on the question of insects as disseminators of plant diseases are summarised. Some of the most important problems in this connection are presented by the mosaic diseases, the investigation of which necessitates a specialised technique, making close co-operation between mycologists and entomologists essential. A programme of work for the solution of these problems is outlined ; they are divided into those concerning the mycologist, the entomologist, and both in conjunction.

RANKIN (W. H.) & HOCKEY (J. F.). **Mosaic and Leaf Curl (Yellows) of the Cultivated Red Raspberry.**—*Phytopathology, Lancaster, Pa.*, xii, no. 6, June 1922, pp. 253–264.

This information has already been noticed elsewhere [*R.A.E.*, A, x, 459].

QUAST (M.). **Beiträge zur Kenntnis der Samenübertragung bei** ***Ephestia kuehniella*****, Zeller.** [Contribution to the Knowledge of Fertilisation in *E. kühniella*, Zell.]—*Archiv. Naturgesch., Berlin*, 1920, lxxxvi, Ser. A, pt. 10, March 1921, pp. 70–90, 13 figs.

The contents of this paper are indicated by its title.

MICOLETZKY (H.). **Die freilebenden Erd-Nematoden.** [The Free-living Earth Nematodes.]—*Arch. Naturgesch., Berlin*, 1921, lxxxvii, Ser. A, pts. 8 & 9, March 1922, pp. 1–650, 1 plate, numerous figs.

This monograph deals with the free-living Nematodes with special reference to those occurring in Steiermark and Bukovina. It comprises a revision of all free-living Nematodes (excluding marine forms). The genera are described, and keys are given to them.

HERBERG (M.). **Coccidenstudien.** [Studies on Coccids.]—*Arch. Naturgesch., Berlin*, 1922, lxxxvii, Ser. A, pt. 10, March 1922, pp. 243–300, 7 figs.

The development of the tracheal system of the following Coccids is described : *Chrysomphalus dictyospermi*, Morg., *Lepidosaphes pinnaeformis*, Bch., *L. gloveri*, Pack., *Parlatoria zizyphi*, Luc., and *P. pergandei*, Comst.

STEINER (G.). **Untersuchungen über den allgemeinen Bauplan des Nematodenkörpers.** [Observations on the General Structure of Nematodes.]—*Zool. Jahrb., Jena,* Abt. Anat. & Ontogenie, xliii, pt. 1, 1921, pp. 1–96, 3 plates, 55 figs.

The object of this paper is to throw some light on the origin and relations of Nematodes.

v. LENGERKEN (H.). **Eine** *Mordellistena* **(Coleopt.) als Schädling an der Orchidee** *Cattleya labiata* **forma** *trianaei* **Duchartre.** [A Species of *Mordellistena* injurious to Orchids.]—*Zool. Jahrb., Jena,* Abt. Systematik Geogr. & Biol. der Tiere, xliv, pt. 6, 1922, pp. 579–594, 18 figs.

Mordellistena cattleyana, Champion (*beyrodti,* sp. n.) [*cf. R.A.E.,* A, ix, 67, 451], of which the various stages are described, is recorded as injuring orchids (*Cattleya labiata*) near Berlin. The eggs of this beetle are inserted into the parenchyma of the leaf. Towards the end of May all stages of larvae were found as well as adults. By the end of June the number of adults began to diminish. As many as four to eight larvae of various stages were found in a single leaf.

ZNAMENSKI (A. V.). **Сроки посева яровых и озимых хлебов с энтомологической точки зрения.** [Times of planting Spring and Winter Grain from the entomological point of view.]—**Труды Полтавской С.Х. Опытной Станции, Народный Комиссариат Земледелия Украины** [*Trans. Poltava Agric. Expt. Sta., National Commissariat of Agric. of the Ukraine*], *Kharkov-Poltava,* no. 33, 1921, pp. 165–173. [Received 1st September 1922.]

Further observations on the attack on various grain crops by *Oscinella frit,* L., show the advisability of the early sowing of spring crops and the late sowing of winter crops, which coincide with the normal time of sowing for the Poltava district. In these circumstances the attack is generally limited to the side-shoots and proves to be beneficial rather than injurious to the yield [*R.A.E.,* A, iii, 231].

LEBEDEV (F. N.). **К Выяснению Вопроса о действии минеральных и растительных Ядов на Азиатскую Саранчу.** [On the Question of the Action of Mineral and Vegetable Poisons on the Asiatic Locust.]—*Kiev,* 1919, 30 pp. [Received September 1922.]

From experiments with sodium arsenite, it is evident that the strength of the solution of this poison is not of any great importance in dealing with locusts. Good results were obtained with a solution of $\frac{1}{8}$ per cent., which is equal to about one pound of poison to $2\frac{3}{4}$ acres. Details are given of the results obtained with various strengths of solution and the mortality caused, also of the amount of food eaten. Apparently very little of the poisoned food is eaten, and feeding practically stops after ingestion of the poison. Feeding also ceases just before and after moulting and on rainy, cold and windy days. The efficacy of the poison depends on the method of application, which is of course useless at times when feeding does not occur. It is essential that the solution be evenly mixed and applied in the form of a fine mist. Should the spray be too dense the drops will coalesce and roll to the ground. These experiments were also confirmed in field tests. Experiments with vegetable poisons were not continued as they proved useless.

PUCHOV (B. A.). **Вредные Кобылки и Борьба с ними отравленными приманками.** [Injurious Locusts and their Control by Poison Baits.] **Петроградская Станция Защиты Растений от Вредителей,** [*Petrograd Sta. Protect. Plants from Pests*], *Petrograd*, 1922, 13 pp.

The superiority of poison baits over other methods for the control of locusts in Siberia and the Cis-Ural district has been generally demonstrated. Either Paris green or sodium arsenite were the poisons used, mixed with wood shavings, sawdust or fresh horse manure. This paper describes the method of preparing the baits and their distribution. Thorough mixing of the poison and judicious application are essential in order to obtain the maximum efficiency.

SVIRIDENKO (P. A.). **Таблица для определения возрастов личинок Марокской кобылки.** [Tables for the Determination of the various Stages of the Larvae of *Dociostaurus maroccanus*, Thunb.]—**Народный Комиссариат Земледелия, Бюро Борьбы с Вредителями Сельского Хозяйства.** [*National Commissariat of Agriculture, Bur. Control Agric. Pests*], *Tiflis*, 1922, 6 pp.

Unlike those of other locusts, the various larval stages of *Dociostaurus* (*Stauronotus*) *maroccanus*, Thunb., are not easily identified by their colouring ; these tables are therefore given to facilitate their recognition.

GIROLA (C. D.). **Fruticultura Argentina. VI.**—*Anales Soc. Rural Argentina, Buenos Aires*, lvi, no. 13, 1st July 1922, pp. 345–355, 7 figs.

In Argentina the pests most commonly occurring on the fruits of *Citrus* are the Coccids, *Lepidosaphes beckii*, Newm., *Chrysomphalus aonidum*, L., *C. dictyospermi*, Morg., *Chionaspis citri*, Comst., and *Mesolecanium deltae*, Liz. The treatment recommended against these is an emulsion of 2 or 3 parts kerosene in 100 parts of water, with the addition of soap ; or fumigation with hydrocyanic acid gas after covering the plants with impermeable tents. Pests found especially on oranges are the Longicorn beetle, *Mallodon spinibarbis*, L., and the caterpillars of *Papilio thoas thoantiades*, Burm.

Report of the Entomological Division. [1921.]—*Trop. Agric., Peradeniya*, lviii, no. 4, April 1922, pp. 216–219. [Received 2nd September 1922.]

The suggested manurial experiments to test the efficacy of nitrogen, potash, or phosphoric acid on the incidence of *Xyleborus fornicatus* (shot-hole borer) [*R.A.E.*, A, ix, 217] are in progress. While the results are not yet conclusive, it seems as though nitrogenous manures do, to a small extent, assist the bushes to withstand borer attack. The information concerning pests of the year has largely been noticed from other sources. The report of the plant-pest and disease inspector contains a list of the commoner pests of tea and of miscellaneous plants.

GOODWIN (W. H.). **Control of Melon Lice or Aphids.**—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster*, vii, no. 7–8, July–August 1922, pp. 122–124, 3 figs.

The treatment is described of a large area of melon plants that were badly infested with melon aphis [*Aphis gossypii*], although they had been sprayed in the ordinary way with Bordeaux and nicotine sulphate. As it seemed impracticable to direct all the nozzles by hand, they were attached to four vertical pipes, which descended from a horizontal one connected to the sprayer. These four pipes were made flexible by being jointed with pieces of rubber hose. The two outer ones were longer than the two middle ones, and the nozzles on them were protected by metal shields from catching in the plants and tearing them out of the ground. The force of the spray turned the leaves over, and a second application made in the opposite direction hit the Aphids and covered them with spray. The liquid used was Bordeaux (3 : 6 : 50) with the addition of 1½ lb. dissolved laundry soap and ½ U.S. pt. nicotine. The entire crop was saved by this treatment and marketed in good condition.

HOUSER (J. S.). **The Airplane in Catalpa Sphinx Control.**—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster*, vii, no. 7–8, July–August 1922, pp. 126–136, 9 figs.

This account of dusting tall trees infested with *Ceratomia catalpae* has been noticed from another source [*R.A.E.*, A, x, 277].

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, nos. 2 & 3, August & September 1922, pp. 108–109 & 203.

Pseudococcus filamentosus occurs on fig trees in Pretoria in small colonies during the winter in wounds, crevices, or against knots of the limbs and main stem. These colonies can easily be destroyed by brushing them with linseed oil or other oily insecticides. When the tree comes into leaf, the mealy-bugs begin to multiply and migrate to the foliage and fruit, which become dotted with the filaments produced by the insects. The infestation, however, seems to have no marked effect on the vitality of the tree and usually declines as the leaves begin to fall.

Experiments are being carried out with remedies for the common and very troublesome house ant, *Pheidole punctulata*. Sodium cyanide is giving very favourable results, but is not generally recommended, owing to its dangerous nature. Sodium arsenite, sodium hyposulphite and vaporite were tried, but did not promise any success.

Observations have been made with a view to determining the degree of parasitism of the larvae of fruit-flies of the genus *Dacus* infesting native olives. From larvae infesting *Olea foveolata*, six parasites were obtained. It was noticed that the host larvae live and pupate within the seed of the olive, the adult emerging from a hole made in the wall. The species of *Dacus* found in *O. woodiana* and also reared from *O. laurifolia* has not yet been determined, but differs from that attacking *O. foveolata*; the larvae live in the pulp of the fruit and pupate in the soil.

BIGALKE (R.). **Common Potato Pests.**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, no. 2, August 1922, pp. 170–175, 2 figs.

This paper has been compiled from various departmental publications and deals with *Heterodera radicicola*, Greef (root gall-worm), *Phthorimaea operculella*, Z. (potato tuber moth) and *Epilachna dregei*, Muls. (potato Coccinellid).

PETTEY (F. W.). **The Control of Codling-moth in Pears in South Africa.**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, no. 2, August 1922, pp. 176–180, 2 figs.

In trials lasting over three successive years it has been definitely proved that dusting under South African conditions is less satisfactory in the control of codling moth [*Cydia pomonella*, L.] than liquid spraying when applied to pears, and is no more successful against the fungus, *Fusicladium*. This may be partly due to the smooth nature of both fruit and leaf as compared with apples, and also to the fact that there are three generations of the moth in a season in South Africa. Dusting on apples, in so far as it has been tried, has also proved a failure. It is thought that this method will nevertheless be largely used in the future against a variety of pests.

WILLIAMS (R. H.). **Locusts: Season 1921–22.**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, no. 3, September 1922, pp. 218–230, 10 figs.

The locust season of 1921–22 was the worst in South Africa for over 20 years. The theory that outbreaks of locusts follow a severe drought has been borne out on the present occasion, for the districts in which infestation was most intense were those that suffered severely from drought in 1919. It is thought that, in addition to the hatching of eggs that were laid by the swarms that escaped destruction in 1920–21, some of those that were deposited in the previous season did not get sufficient rain for hatching, and these also hatched during the present season. The poison-bait method of destroying locusts is becoming more popular than spraying, though the latter has proved the most effective method of destroying the flying swarms while they are resting at night or in the early morning. A natural enemy that caused much destruction among the insects was the large fly, *Wohlfahrtia brunnipalpis*, which deposits its larva on the back of the locust, attacking both the flying insects and also those in the last nymphal stage. A small black unidentified fly has been observed depositing eggs on the egg-masses of the locusts immediately they have been laid and before they have time to harden. The maggots of this fly devour the eggs, as many as 75 per cent. having been destroyed in one district. The locust birds, *Ciconia ciconia* (European stork) and *Abdimia abdimii* (black stork), appeared in great numbers in January and February, following the flying swarms, until absence of water eventually forced them to turn back. The small locust bird, *Glareola melanoptera*, was also seen, but the abnormally dry season had driven the majority away to places with more regular rainfall. The wattled starling (*Creatophora carunculatus*), kestrels and hawks also did some damage to the flying swarms.

Observation has shown that the female locust deposits more than one pocket of eggs during her lifetime, as many as 12, giving an aggregate of 428 eggs, having been produced in one case. The devastation was not as serious as it might have been, owing to the fact that many crops had ripened before the locusts reached the flying stage, and also owing to the intelligence system in vogue, by which it was possible to warn farmers when flying swarms were travelling in their direction, so that crops could be gathered at the earliest possible moment. The system of cooperation among farmers, which has greatly facilitated the work of destruction, is described. As it is now generally believed that a portion of the South-west African Protectorate is a permanent breeding-place for locusts, steps are being taken to review the position in that territory and to devise means for dealing with it. A widespread infestation is expected in the season of 1922–23, provided that climatic conditions are favourable. Experiments are to be made in the use of a concentrated arsenical solution without the addition of treacle, though from the administrative point of view, there are certain disadvantages in the use of such solutions.

PETTEY (F. W.). **Codling-moth Control in Fruit Sheds.**—*Jl. Dept. Agric. Union S. Africa, Pretoria,* v, no. 3, September 1922, pp. 245–248, 1 fig.

Infestation by codling-moth [*Cydia pomonella*, L.] frequently persists in orchards that are well sprayed, owing to the breeding of the moths in the storage and drying sheds, whence the adults pass out into the orchards again. This, however, can be almost entirely prevented if measures are taken to prevent the escape of the moths from the sheds.

A successful trap for storeroom use is described. This consists of a narrow board $1\frac{1}{4}$ in. wide by $\frac{1}{2}$ in. thick, nailed firmly along the top of one side of a ceiling board. Both boards are then screwed tightly along each wall of the storeroom, parallel with and two feet from the floor, with the narrow board against the wall, and are so attached that the top edge of the narrow board is level with the top edge of the ceiling board, the tongue of which has been planed away. There is thus a space the thickness of the narrow board between the lower two-thirds of the ceiling board and the wall of the room. Narrow strips of bagging are stuffed into this space to form an attractive shelter for the larvae, and tree tanglefoot is placed along the top of both boards to prevent larvae from crawling over the trap, which is screwed into wooden pegs driven into holes drilled in the wall. It is essential that the storeroom walls should be smooth and without cracks, preferably of brick covered with cement, for at least two feet above the ground. The infested fruit should be placed in a heap on straw on the floor, along the walls, and no boxes, tables or trays should be left in the room. All larvae should be removed from the trap once every two and a half weeks until the middle of February. After that they need not be removed until the end of the fruit season, as they do not develop into moths until the spring. Windfalls should be picked up and placed in the storeroom with infested fruit. The trap described can equally well be used for infested fruit piled in the open, provided that it is placed on a cement floor, surrounded by a wall suitable for the trap.

MUESEBECK (C. F. W.). U.S. Bur. Ent. **A Revision of the North American Ichneumon-flies belonging to the Sub-families Neoneurinae and Microgasterinae.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lxi, Art. 15, no. 2436, 1922, pp. 1–76, 1 plate.

The above two sub-families of Braconids are incorporated in this paper for the reason that one or both of the genera, *Neoneurus*, Haliday, and *Elasmosoma*, Ruthe, with constitute the sub-family, NEONEURINAE, have been generally placed in the sub-family MICROGASTERINAE. Tables are included of the known genera of both these sub-families, with keys to the North American species and notes on their synonymy. Thirty-four new species are described, including *Mirax texana*, reared from a Tineid ; *Adelius nigripectus*, from the larva of a poplar leaf-miner ; *Apanteles alypiae*, from *Alypia octomaculata*, F. ; *A. olenidis*, from *Olene vagans*, Barnes & McDunn. ; *A. mimoristae*, from *Melitara junctolineella*, Hulst, and *Mimorista flavidissimilis*, Grote ; *Microgaster ecdytolophae*, from *Ecdytolopha insiticiana*, Z., *Canarsia hammondi*, Riley, and *Gelechia* sp. ; *M. schizurae*, from *Schizura unicornis*, S & A., and *S. concinna*, S. & A. ; *M. harnedi*, from *Pyrausta ainsliei*, Heinr., and *Diatraea* sp. ; *M. pantographae* from a Pyralid leaf-roller (probably *Pantographa lineata*, Grote & Rob.) on lime (*Tilia*), and from *Gelechia cercerisella*, Chamb. ; *M. swammerdamiae*, from *Swammerdamia castaneae*, Busck ; *M. phthorimaeae*, from *Phlyctaenia ferrugalis*, Hb., and *Phthorimaea operculella*, Z. ; *Microplitis kewleyi*, from *Euxoa* spp. ; *M. brassicae*, from *Phytometra* (*Autographa*) *brassicae*, Riley ; *M. plutellae*, from *Plutella maculipennis*, Curt. ; *M. scutellatus*, from a Geometrid larva on lucerne ; *M. montanus*, from *Catocala verilliana*, Grote ; and *M. feltiae*, from *Feltia gladiaria*, Morr., and *F. annexa*, Treit.

A list of the hosts of the MICROGASTERINAE is included.

BAUDYŠ (E.). **Einige Bemerkungen über das Leben des Getreidelaufkäfers.** [Some Remarks on the Life of *Zabrus gibbus*.]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvii, no. 7-8, 1st August 1922, p. 134.

It is generally supposed that *Zabrus gibbus* feeds at night and remains hidden by day. Between 1910 and 1919 the author has repeatedly observed this beetle sucking the grains of corn at noon in sunshine. Another observer noticed *Z. gibbus* feeding on rye on sunny days.

BALLY (W.). **[The Spread of the Coffee-berry Borer to Central Java.]**—*Proefst. Mid.-Java, Salatiga*, Circ. 1, 23rd July 1921, 1 p. typescript. [Received 6th September 1922.]

The appearance of the coffee-berry borer [*Stephanoderes hampei*] in Central Java is recorded ; and the attention of planters and traders is drawn to the danger of the dissemination of this beetle in coffee seed and by means of baskets and other harvesting apparatus.

VAN DAVELAAR (L.). **Bestrijding Koffiebessen Boeboek.** [Measures against the Coffee-berry Borer.]—*Proefst. Mid.-Java, Salatiga*, Circ. 2, 2nd August 1921, 2 pp. typescript. [Received 6th September 1922.]

The author recommends the following measures against the coffee-berry borer [*Stephanoderes hampei*]. All fallen berries should be collected, sprinkled with petroleum and burned. Attacked berries

on the bushes should be touched at the place of infestation with benzine, the spot being then dabbed with tar or paint so that they may be recognised. The bushes should be kept down to six feet in height, as this facilitates the work. All these measures must be preceded by the picking of all ripe, half-ripe and blackened berries.

A note by Dr. W. Bally points out that it is desirable to ascertain whether benzine kills the eggs, larvae and pupae as well as the adults, and whether this method is practicable in the case of plantations in full bearing.

HALLAUER (—). [**The Coffee-berry Borer.**]—*Proefst. Mid.-Java, Salatiga,* Circ. 3, 28th September 1921, 1 p. typescript. [Received 6th September 1922.]

The measures recommended in the preceding paper against the coffee-berry borer are being tried on a large scale in collaboration with the Central Java Experiment Station.

HALLAUER (—). **Maandelijksch Bericht over het Verloop der Proeven met de Methode Van Davelaar gedurende de Maand October.** [Monthly Report on the Experiments with Van Davelaar's Method in October.]—*Proefst. Mid.-Java, Salatiga,* Circ. 5, 6th November 1921, 2 pp. typescript. [Received 6th September 1922.]

As described here, this method for combating the coffee-berry borer differs from that originally worked out by van Davelaar [see above]. The first procedure is a protective application to the berries of a solution of axle grease in benzine, petroleum, or a mixture of petroleum and benzine. The coating is now applied sparingly, so that it does not penetrate far within the berry clusters, the result being more satisfactory than with the former liberal application. This treatment is followed by the application of a mixture of thick fat with 5–10 per cent. petroleum in order to kill the beetles and their brood.

HALLAUER (—). **Koffiebessen-Boeboek.** [The Coffee-berry Borer.]—*Proefst. Midden-Java, Salatiga,* Koffiebessen Boeboek Serie, Circs. 6–11, December 1921–July 1922, 8 pp. typescript.

These circulars include information on the experiments in combating the coffee-berry borer [*Stephanoderes hampei*] according to van Davelaar's method [see above] progressively modified. One user of this method records his opinion that it is practicable and economical in actual plantation work in spite of the time and expense involved. The first (protective) mixture is made up of six parts axle grease and one part petroleum. A thin coat that does not run on to the stems of the berries is applied, the brush loaded with the mixture being applied first to the large berries and then to the small ones, which thus get a really thin coat. The second (killing) mixture consists of one part thick fat mixed with one part petroleum, and is applied to the bore-hole by means of a piece of wood. The last circular (no. 11) deals with the precautions needed when harvesting the coffee crop. The baskets, etc., must be kept free from infestation and no blackened berries must be left on the bushes or on the ground.

ULTÉE (A. J.). **Verslag over het Jaar 1921.** [Report of the Besoeki Experiment Station for 1921.]—*Meded. Besoekisch Proefst., Djember,* no. 32, 1922, 38 pp.

Tobacco seedlings were attacked by the caterpillars of *Phytometra (Plusia) signata* and *Heliothis obsoleta,* which were checked by a lead arsenate spray. The measures advocated against Lepidopterous pests of tobacco are the use of a spray of lead arsenate and soap on seedlings in the beds and, if necessary, after planting out. When the plants are a foot high, dry lead arsenate should be dusted on them, and later on, when their size renders this inconvenient, the caterpillars should be picked off. Against Aphids in the dry season a solution of tobacco soap proved a cheap and effective remedy.

WILLCOCKS (F. C.). **A Survey of the more important Economic Insects and Mites of Egypt.**—*Sultanic Agric. Soc., Cairo,* Tech. Sec., Bull. 1, 1922, viii+483 pp.

No attempt has been made for many years to give a general account of the commoner insects and mites that damage agricultural and horticultural crops in Egypt. This work presents a preliminary survey consisting of a series of notes and brief records, and is divided into sections dealing with pests of agricultural crops, vegetable crops, fruit and fruit trees, timber, ornamental and shade trees, and stored products, household pests, pests affecting the health of man and animals, and insects injurious to bees. The more commonly used insecticides are enumerated, and instructions are given for their preparation. The author considers that the apparent apathy of the native population with regard to pests is due, not so much to indifference as to lack of teaching and of available literature on the subject, and it is hoped that this publication will at least temporarily fill this want, and perhaps lead to further work on the same lines.

FERRIÈRE (C.). **Entomologie economique. Les Problèmes modernes de la Lutte contre les Insectes et leur Application en Suisse.**—*Berne,* Edn. Ernest Bircher, 1922, 36 pp.

This work is divided into a series of chapters explaining the growth of the interdependence between entomology and agriculture, horticulture, sylviculture, and the rearing of domestic animals and public health, as well as various branches of industry and commerce. The last chapter discusses the status of economic entomology in Switzerland. Attention is called to the importance that is attached in the United States to the problems connected with entomology, and it is deplored that Switzerland is almost alone in possessing no special service of entomology and phytopathology. Though there are competent entomologists at the various federal experimental stations, as well as in the various agricultural schools, there is a lack of cohesion among these institutions, as well as a shortage of funds, and this prevents prompt and efficient treatment of problems as they arise.

Some of the more pressing problems in Switzerland are the improvement of the campaigns against *Melolontha* ; measures against the larvae of cabbage butterflies [*Pieris brassicae,* L.] ; wireworm damage to wheat ; the woolly aphis [*Eriosoma lanigerum,* Hausm.] in orchards ; and Aphids and Coccids, notably the occurrence of *Diaspis pentagona* on mulberry trees at Tessin, which menaces the silkworm industry and should be dealt with by the biological method, as is being done in Italy

As regards hygiene, flies and mosquitos should be dealt with, and the distribution of Anophelines especially requires investigation.

Some suggestions are tentatively put forward for the better organisation and use of the existing institutions in the country, on the lines successfully adopted elsewhere.

Work in connexion with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept., Antigua, 1920–21, Barbados,* 1922, pp. 8–9.

The pests of sugar-cane were the same as in the previous year [*R.A.E.*, A, x, 58]. On cotton, *Alabama argillacea* was present more or less throughout the Island without doing very considerable damage. Adults of *Dysdercus andreae* appeared in large numbers from September onwards, but were kept in check by traps of cotton seed. *Eriophyes gossypii* (cotton-leaf blister mite) was common throughout the Island, and was very difficult to control owing to the large amount of wild cotton growing in uncultivated land. On limes the Coccids, *Lepidosaphes beckii*, *Chionaspis citri* and *Coccus viridis* were troublesome. *Euscepes* (*Cryptorrhynchus*) *batatae* is generally prevalent where sweet potatoes are grown. When crop rotation is practised, however, the plants are usually free from infestation.

The Rhododendron Bug (*Leptobyrsa* (*Stephanitis*) *rhododendri*, **Horv.**).—*Jl. Minist. Agric., London,* xxix, no. 6, September 1922, pp. 555–558, 4 figs.

Stephanitis rhododendri, Horv. (rhododendron bug) has been observed in Great Britain since 1910; it was probably introduced from the Eastern United States, its food-plants there being *Rhododendron* and *Kalmia*. The newer rhododendron hybrids are far more susceptible to damage than the long-established *Rhododendron ponticum*. An obvious sign of injury is the presence of brown spots on the lower surface of the leaves, with a slight freckling on the upper surface, as the bugs suck the sap. In severe cases the whole plant is seen to wilt, and, in unfavourable weather conditions, death may result.

A description of this Tingid is given, with an account of its life-history, which is similar to that recorded in France [*R.A.E.*, A, vi, 530]. In the case of small plants, a simple soap wash consisting of 1 lb. soft soap in 10 gallons of water is efficient, but the lower surface of the leaves must be thoroughly wetted by the spray, and this is not easy in the case of large, thick bushes. The addition of one fluid ounce of 95–98 per cent. nicotine in each 10 gallons of the above wash renders it more effective, and is justified in the case of valuable plants or when the purpose is complete eradication of the pest. As the eggs are laid on the leaves, it is a good plan to remove and burn all infested ones during the winter. Hand-picking in the summer is also quite effective if practised when the bugs first appear in a previously uninfested garden.

Paillot (A.). **Contre la fausse Chenille du Pêcher.**—*La Vie Agric. et Rur., Paris,* xxi, no. 35, 2nd September 1922, pp. 166–167.

This paper on *Neuroloma nemoralis* has been noticed from another source [*R.A.E.*, A, x, 537].

Faes (H.). **La Culture du Pyrèthre et l'Utilisation en Viticulture de la Poudre de Pyrèthre.**—*La Vie Agric. et Rur., Paris,* xxi, no. 35, 2nd September 1922, pp. 169–171, 2 figs.

The information contained in this paper has already been noticed [*R.A.E.*, A, x, 231].

MARIÉ (M. P.). **Destruction des Scolytidae par les Arbres-Pièges dans les Exploitations de Conifères.**—*Bull. Soc. Path. Vég. France, Paris*, ix, no. 2, April–June 1922, pp. 120–124.

While trap trees for the destruction of the Coleoptera that live in the bark of forest trees have been in use for a considerable time, no very detailed instructions for their practical employment seem to have been published. It has been noticed that not only do these xylophagous insects prefer sickly or recently felled trees for oviposition, but also that a female bred from a dying tree, or a tree felled during the winter, has a reproductive capacity almost double that of one developed on a healthy tree. Experience has shown the necessity of decorticating felled trees; otherwise the Scolytid infestation will increase until the entire coniferous stand may be destroyed. The following treatment has been found to give a large measure of success during the first year, and practically complete success after the second, provided that the procedure is correctly carried out. The first trees to be used as traps should be cut down in winter and left on the ground. As soon as the warm weather begins, oviposition punctures, which are easily visible, should be searched for on the felled trunks. Six weeks after these are first observed, when all oviposition of the various species of bark-beetles may be expected to have been completed, the felled trees should be removed to the edge of the wood, decorticated, and the bark burnt on the spot. This treatment should be repeated in summer, by felling a new series of trap trees at the end of July and removing them in September, in order to destroy a possible second generation.

If the infestation begins in small patches, involving a few trees only, those that show signs of infestation by turning yellow should be examined for larval galleries by removing small pieces of bark; if any are found, the trees attacked should be removed, decorticated and the bark burnt. Then, during the winter, two or three healthy trees should be cut down in the infested areas to act as traps and the treatment described above followed; two further trees being then felled to trap any insects surviving on adjacent trees. This treatment is generally effective in the first year.

If the infestation is general, but not very severe, all affected trees and all obviously sickly ones should be removed and the bark taken off and burnt; in the winter a first series of trap trees should be felled throughout the plantation, and again in summer as described above. This treatment should be followed for two years, felling in each year three to four per cent. of the trees for spring traps and two per cent. for the summer traps.

In cases where infestation has already exceeded 20 per cent. of the trees the plantation is doomed, and it is best to cut down all the trees at once before the healthy ones have lost their marketable value. In old plantations, where the trees are all more or less infested and have ceased growth and show signs of weakness due to age, as, for example, in ornamental stands that it is desirable to preserve as long as possible, the methods outlined above are applicable, but the number of trap trees used must be at least 10 per cent. of the total stand, with another five per cent. for the summer traps. Even then, the difference between the felled trees and the sickly ones in the stand is not sufficient to attract all infestation to the traps.

All trees that are felled for traps should have their branches cut off, otherwise the sap will evaporate too rapidly through the foliage. The large branches should be laid beside the trunks and treated exactly in the same way, and will thus form additional traps. If there is no use for the small branches and twigs, these can be left on the ground, as their reserve of sap is not sufficient for development of the larvae.

The author's experience has been that the cost of the treatment is covered by the value of the felled trees as timber, while the number that are cut down for traps is no greater than those felled during thinning, which becomes necessary every six or eight years.

BADOUX (H.). **Pests of the Weymouth Pine in Switzerland.**—*Jl. Forestier Suisse, Berne*, lxxii, no. 9, September 1921, pp. 163–173. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 11, November 1921, pp. 1500–1502.) [Received 11th September, 1922.]

Though long supposed in Switzerland to be immune, the Weymouth pine (*Pinus strobus*) is attacked by a number of enemies.

An Aphid, *Chermes* (*Pineus*) *strobi*, Htg., has frequently appeared of recent years in stands 30 years of age or older. Coleopterous pests include the Scolytids, *Xyloterus lineatus*, Oliv., in felled, but unbarked logs, *Pityophthorus micrographus*, L., in branches and small trunks, and *Pityogenes* (*Tomicus*) *quadridens*, Htg., *Myelophilus piniperda*, L., and *M. minor*, Htg., in the trunk and shoots. Plantations are occasionally much damaged by the weevil, *Hylobius abietis*, L., and trunks infected with the fungus, *Peridermium strobi*, sometimes harbour *Pissodes pini*, L. The larvae of the sawfly, *Diprion* (*Lophyrus*) *pini*, L., have appeared regularly for years towards mid-September upon *Pinus strobus* growing in the garden of the Zurich Forestry Institute, but without doing any great injury. The moth, *Dioryctria splendidella*, H.S., has been recorded since 1919 in stands infected with *Peridermium strobi*, and increases the injury done. Otherwise it is unimportant, as it only attacks trees already diseased.

THEOBALD (F. V.). **Thrips in Corn.**—Reprint from *Jl. Kent Farmers Union* [*sine loco*], xii, no. 2, August 1922, 2 pp.

Limothrips cerealium, Hal., and *L. denticornis*, Hal., seriously damaged wheat in Kent in 1922, and occasionally oats and other cereals were attacked. The tips of the ears, where the insects feed, become pallid and no grain forms in the attacked portions, and it is found when the corn is threshed that the maturing grain has shrivelled. Breeding takes place in the ears, and all stages may be found simultaneously there. The winged adults fly about periodically, generally in sultry weather. They may be carried by the wind for considerable distances. As the corn ripens the thrips gradually leave it, being unable to penetrate the ripe kernels. They seem to pass the winter either as pupae or adults, generally in the soil, or in hollow stalks or among grasses and stubble. Besides wheat *L. cerealium* attacks oats, and *L. denticornis* barley and rye. They often cause severe damage on the Continent, where a third species, *Frankliniella tenuicornis*, also attacks barley.

The only method of checking infestation is by early sowing and the destruction of hibernating insects. The earlier spring oats are sown, the more likely they are to escape injury from thrips and also from frit-fly [*Oscinella frit*]. It is suggested that all stubble should be harrowed

and burnt immediately after harvest or very early in the following spring. The land should be further cleared by a dressing of gas lime or a soil insecticide. Headlands should be brushed and the refuse burnt there during late autumn or early spring, as the thrips may hibernate there in considerable numbers.

EDWARDS (F. W.). **A third new British** *Plastosciara* **(Diptera, Sciaridae).**—*Ent. Mthly. Mag., London*, no. 698, July 1922, pp. 160–161.

Plastosciara perniciosa, sp. n., here described, was found attacking cucumber roots and stems in Sussex in May 1922.

CORBETT (G. H.). **Entomological Jottings.**—*Malayan Agric. Jl., Kuala Lumpur*, x, no. 2, February 1922, pp. 56–59.

The Hispid, *Plesispa nipa*, has been found on *Nipa fruticans* and *Metroxylon sagu* near Malacca. This beetle closely resembles *P. reichei*, a pest of young coconut palms, and it causes similar damage to the plants it attacks. It can, however, be distinguished by its reddish colour; and its eggs are laid in groups, while those of *P. reichei* are laid singly. The weevil, *Astycus chrysochloris*, is generally distributed throughout Malaya, the adults feeding on the leaves of rubber, limes, castor, etc. The eggs are laid in the soil and hatch in about seven days. *Dysdercus cingulatus* (cotton stainer) also attacks roselle [*Hibiscus sabdariffa*] and other plants. The eggs are laid in the soil and hatch in about a week. The adults can be collected by hand or shaken into a bag fitted with a tin funnel. *Attacus atlas* (atlas moth) is frequently found in the caterpillar stage on soursop, candle-nut, guava, camphor and limes. The eggs should be collected by hand. The Geometrid, *Hemithea costipunctata*, is very troublesome on the flowers of rubber in Kuala Lumpur. A Lepidopterous borer of rice has been identified as *Diatraea auricilia*. The eggs are laid in groups on the leaves, and some have been observed to be parasitised. Various caterpillars have been noted damaging the candle-nut tree (*Aleurites* sp.). *Prodenia litura* has a large variety of food-plants, including castor. The eggs are laid in groups on the leaves and hatch in about three days; the caterpillars live gregariously for a time and then scatter over the plant. After about 20 days they enter the soil for pupation, and the adults emerge about a week later. Egg-masses and caterpillars should be collected as soon as they appear. Where necessary, arsenical sprays might be employed.

The greater coconut spike moth is responsible for some of the spikes failing to produce nuts. Eggs are laid singly on the spikes, generally where the buds overlap one another. They hatch in from three to six days, and the larvae usually feed on the male flowers of the spike, forming a gallery of excrement through which they move when disturbed. Pupation takes place on the spike, the spathe, or at the base of the spike. The minimum cycle from egg to adult seems to require 28 days and the maximum 43 days. All badly attacked spikes should be removed and burnt and the trees cleared of fallen buds. Experiments are being made in spraying and dusting. The lesser coconut spike moth [*Tirathaba* sp.] damages both male and female flowers before the spathe opens; this injury by the caterpillars does not seem to have been previously recorded. The white cocoons can be seen at the base of the spike and occasionally on opening the spathe the moths emerge.

Leptocorisa varicornis (padi-fly) is well known as a pest of ripening rice, and has also been bred on the ripening seed of various grasses that grow in the vicinity of rice. These grasses are used as food-plants when rice is not present, and should therefore be prevented from flowering.

HARUKAWA (C.). **Studies on the Peach Saw-fly,** *Eriocampoides matsumotonis*, **Matsumura.**—*Ber. Ōhara Inst. landw. Forschungen, Kuraschiki*, ii, no. 1, 1921, pp. 21–46, 2 plates. [Received 12th September 1922.]

This paper contains additional information to that published previously [*R.A.E.*, A, vii, 273]. *Eriocampoides matsumotonis*, Matsumura, may begin ovipositing without mating as soon as it emerges. Unfertilised eggs produced males only in the author's experiments. The average number is 20 per female. The egg stage averages from 7 to 11 days according to the season. The larval period is also subject to seasonal variation and averages from 14 to 23 days. The longest larval period occurs in the third generation, the individuals of which overwinter in the cocoon underground. It is probable that such individuals of the second generation as are much delayed in growth may also hibernate. The true pupal period lasts four or five days, though about a fortnight elapses between the entrance of the larva into the ground and the emergence of the adult. Natural enemies include a Chalcid egg-parasite and apparently three Ichneumonid larval parasites.

Though the adult does not seem to fly far—so that infestation is usually restricted to a part of an orchard—there is a possibilty of wind-carriage. The cocoon may be carried in the soil clinging to the roots of transported plants. Experimentally a soap solution, 4 oz. per gallon, killed all the larvae; at half-strength 70 per cent. succumbed. With lead arsenate, 2 lb. in 5 gals. water, a few larvae survived. Since the larvae do not burrow deep into the ground, and are not very resistant to adverse climatic conditions, clean cultivation and mid-winter tillage should be effective in controlling this pest.

KASAI (M.). **Observations and Experiments on the Leaf-roll Disease of the Irish Potato in Japan (Preliminary Report).**—*Ber. Ōhara Inst. landw. Forschungen, Kuraschiki*, ii, no. 1, 1921, pp. 47–77. [Received 12th September 1922.]

A disease of potatoes has been identified with the leaf-roll of Western countries. It is transmissible through tuber grafting or juice infection, and by insects.

SILVESTRI (F.). **La Formica argentina.** [The Argentine Ant.]—*R. Lab. Ent. Agrar., R. Scuola Sup. Agric., Portici*, Circ. 1, 2nd edn., 30th August 1922, 7 pp., 1 fig.

A brief description of *Iridomyrmex humilis*, Mayr, its distribution and habits, is given. Brazil is probably the original habitat of this ant. It was noticed in Italy, at Meta, about 20 years ago, but has only attracted serious attention since the war. Measures against it are now compulsory. The formula given for a poison bait is one used in the United States, and is almost identical with one already noticed [*R.A.E.*, A, viii, 507]. Shelter-traps, baited with decomposing vegetable matter, attract the ants in large numbers.

LAPAZARÁN (J. C.). **Una Campaña de Langosta en Zaragoza.** [An Anti-locust Campaign in Saragossa.]—*Bol. Agric. Téc. Econ., Madrid*, xiv, no. 163, 31st July 1922, pp. 599–608.

An account is given of the anti-locust campaign in Saragossa, where much damage was done by *Dociostaurus maroccanus*, especially in cultivated lands near rivers. During the winter the breeding-places were, as far as possible, broken up. In the spring flame-throwers were used against the locusts, and gave promising results ; spraying with a 50 per cent. emulsion of chloropicrin proved fatal to every insect that was actually hit by the spray. Various poisons were tried on a small scale, lead and sodium arsenates being chiefly used, but the results were not entirely satisfactory and were difficult to estimate owing to the slow effect of the poison and the rapid migration of the locusts. In the next campaign it is hoped to follow the plans suggested by Vayssière for use in France [*R.A.E.*, A, ix, 403].

LAPAZARÁN (J. C.). **Una Campaña de Langosta en Zaragoza.** [An Anti-locust Campaign in Saragossa.]—*Bol. Agric. Téc. Econ., Madrid*, xiv, no. 164, 31st August 1922, pp. 693–698.

Experiments are being made with the object of using *Coccobacillus acridiorum*, d'Hér., against locusts in the province of Saragossa. As regards other recognised methods, the conclusion is reached that while measures exist that are capable of destroying the pest, they are difficult to apply in the various countries where locusts occur as a result of the arid climate. The cost of really effective measures is prohibitive ; for the province of Saragossa it is estimated at over £50,000.

ECKSTEIN (F.). **Abwehr gegen Tachineninfektion. Vorläufige Mitteilung.** [Defence against Tachinid Infestation.]—*Centralbl. Bakt. Paras. Infektionskr., Jena*, IIte Abt., lvii, no. 1–3, 26th August 1922, pp. 61–69, 6 figs.

In the course of an outbreak of *Acantholyda* (*Lyda*) *stellata* in a Bavarian forest district, considerable parasitism by Tachinids occurred, some batches of material being infested up to 60 per cent. The sawfly larvae showed cuticular discolorations, and hard, dark capsules were formed that enclosed the parasitic larvae. The first stages of such capsule formations were also seen in the case of an Ichneumonid parasite, and appear to be an attempt on the part of the host to protect itself from parasitic attack.

ZIMMERLEY (H. H.), GEISE (F. W.) & WILLEY (C. R.). **Dusting Vegetable Crops in Eastern Virginia. Preliminary Report.**—*Virginia Truck Expt. Sta., Norfolk*, Bulls. 35–36, 1st April–1st July 1921, pp. 193–208, 6 figs. [Received 12th September 1922.]

This paper records results obtained during 1921 in a study of the effectiveness and of the methods of application of certain insecticides and fungicides in dust form. In the authors' summary it is stated that the carriers, used both separately and in combination, were finely

screened hydrated lime, kaolin and kieselguhr [a kind of fossil earth]. The source of copper was anhydrous copper suphate ; both calcium arsenate and lead arsenate furnished the arsenicals, and the nicotine was derived from nicotine sulphate. A power duster was used, equipped with flexible outlet tubes and metal spreaders ; these were arranged in various ways and bent at different angles according to the nature of the crop to be treated, so that the best possible distribution with the least waste of material could be secured. Under both laboratory and field conditions hydrated lime, kieselguhr and kaolin as carriers of nicotine proved of equal value in Aphid control, lime being the cheapest. In the laboratory 3 per cent. nicotine dust proved the most effective in the control of *Myzus persicae*, Sulz. (spinach aphis), *Macrosiphum solanifolii*, Ashm. (pink and green aphis), *Brevicoryne* (*Aphis*) *brassicae*, L. (cabbage aphis), and *Aphis gossypii*, Glov. (melon aphis). Taking the average for the four species, the 1, 2 and 3 per cent. nicotine impregnated dusts killed 72·2, 82·1 and 89·3 per cent. respectively. For the two first-named Aphids on spinach a hydrated lime-carrier with 2 per cent. nicotine impregnated dust proved the most economical. The quantity necessary varied from 20 to 40 lb. per acre. For the control of the Colorado potato beetle (*Leptinotarsa decemlineata*, Say) a dust mixture, containing at least 20 per cent. calcium arsenate, is recommended. Against *Phytometra* (*Autographa*) *brassicae*, Riley (cabbage looper), and *Pieris* (*Pontia*) *rapae*, L. (imported cabbage worm), on kale and Brussels sprouts, a material called Noburn, containing approximately 23 per cent. arsenious oxide derived chiefly from Paris green, and a 50 per cent. calcium arsenate dust gave equally good results. The former was the more rapid in action.

STEARNS (L. A.). **The Life-history of the Oriental Fruit Moth in Northern Virginia.**—*Virginia Agric. Expt. Sta., Blacksburg, Montgomery*, Tech. Bull. 21, March 1921, 46 pp., 8 figs. [Received 12th September 1922.]

This bulletin gives an account of the life-history of *Cydia* (*Laspeyresia*) *molesta*, Busck (Oriental fruit moth), in more detailed form than in previous publications [*R.A.E.*, vi, 369, 373 ; vii, 478 ; viii, 354, etc.]. In the course of these investigations it was found that there were four complete generations in 1919 and 1920. Only a partial fourth was recorded in 1920, as a small percentage of the third generation larvae failed to transform. This is probably the normal occurrence. A summary of the seasonal life is shown in a chart.

Control of Insect Pests and Diseases of Vegetable Crops.—*Mthly. Bull. Ohio Agric. Expt. Sta., Wooster*, vii, no. 5–6, May–June 1922, pp. 89–97.

Information is given on general measures that will tend to keep down insect infestation. These include clean cultivation, the application of fertilisers, and the use of domestic animals. The more general insecticides and fungicides are enumerated, with instructions for their preparation; and a table shows the commonest forms of insect and fungous infestations of the different crops, with particulars of remedies for each.

BRITTAIN (W. H.). **The Present Distribution and Economic Status of the Apple Sucker** (*Psylla mali*, **Schmidberger**).—*Scientif. Agric. Ottawa*, iii, no. 1, September 1922, pp. 23–29.

Much information is here collected from various sources on the distribution and status of *Psylla mali*, Schmidb., in various countries. The opinion of fruit-growers as to its importance as a pest in Nova Scotia varies greatly. On the whole, it seems certain that it is a much less serious pest than *Lygus communis*, Knight (green apple bug), as its punctures do not seem to have the same poisonous effect. The injury it does is apparently entirely due to the loss of sap caused by feeding, and observations indicate that light infestations, where there is good blossom, do not greatly affect the current season's crop. When the blossom is light or moderate, the injury may be severe, and the destruction of blossoms and leaves becomes apparent. In heavily infested orchards oviposition may also occur on the pear, though the apple is evidently preferred; plums and quinces have been attacked on rare occasions.

BODKIN (G. E.). **[Report of the] Government Economic Biologist.**—*Rept. Dept. Sci. & Agric. Brit. Guiana, 1920, Georgetown*, 1922, Appx. iii, pp. 51–58.

The moth-borer [*Diatraea saccharalis*, F.] on sugar-cane is largely controlled by native collection of the egg-masses. A good plan followed on one estate was the collection of the eggs into special trays, so arranged that the parasites could emerge and escape to the neighbouring canes. These trays were moved about from time to time in the plantations. Complete control by means of parasites is not, however, possible. Rice was free from pests; the weevil referred to in the last report [*R.A.E.*, A, x, 101] as probably *Lissorhoptrus simplex*, Say, has not again made its appearance.

Coconuts, in two districts of Georgetown, were severely infested with *Brassolis* [*sophorae*, L.], many of the old trees being so completely defoliated that they died. Co-operation in clean culture and adequate pruning is essential for the eradication of this pest, and it is suggested that in the event of another outbreak in the region, legislation should be passed making certain measures compulsory. It was noticed that several species of palms were attacked that had not previously been infested. Of 83 adults reared in the laboratory, 64 were females and 19 males. Eggs laid by an unfertilised female are said to have produced larvae, but this requires further investigation.

Further work on the giant borer [*Castnia daedalus*, Cram.] on coconut revealed a number of eggs attached to the "matting," where it was stretched about the bases of the branches. These were found singly, but there were generally two or three on the same piece of matting. Young larvae were observed entering from the outside of the branch, at its base and where it was covered by the branch below. They bore for preference in the young, soft, white part of the trunk; more mature larvae were found in older parts of the trunk. One trunk examined in detail showed infestation extending from about 4 ft. above the ground and covering about 6 ft. of trunk, the usual size of the borings being from 4 to 6 in. long and about 1½ in. deep. Trees in which the attack is far advanced show a peculiar bending of the branches at the bases of the leaflets, and these branches are easily broken down. A palm that is badly attacked ceases to bear nuts, either on account of its weakened

state, or because the larval borings have crossed the bases of the tissues and either injured them directly or caused rot of the stem. If larvae are numerous, they will weaken the trunk just below the heavy crown so that it breaks off and the tree dies [*R.A.E.*, A, ii, 57]. A mixture of 1 oz. creosote with 1 oz. kerosene oil was injected into a burrow of an infested palm and killed the larvae present. One part creosote to three parts kerosene killed two out of three larvae. About 1 oz. of the mixture was used in each case.

In one district the blossoms of the palms were found to be infested by the larvae of a small moth, *Blastobasis ochrobathra*, Meyr. *Cylas formicarius*, F., was found on sweet potatoes, and *Diabrotica separata*, Baly, on squash.

JARVIS (H.). **Fruit-fly Investigations. Fourth Progress Report.**—*Queensland Agric. Jl., Brisbane,* xviii, pt. 2, August 1922, pp. 131–133.

Further instances of the value of cold storage of fruit for the destruction of eggs and young larvae of the fruit-fly, *Dacus ferrugineus* (*tryoni*), are recorded [*R.A.E*, A, x, 522]. In apples submitted to a temperature of 38° F. for seven weeks, all the larvae were killed before material damage had been done.

The red mite, *Bryobia* sp., was very numerous in the egg stage in many orchards during the period under review, trees harbouring the eggs looking as though painted with bands of light red. Although not credited with doing much damage, these mites, if sufficiently abundant, might have a serious effect on the trees.

DALLIMORE (W.) & MUNRO (J. W.). **Additions to the Wild Fauna and Flora of the Royal Botanic Gardens, Kew : xvi. Bark Beetles.**—*Bull. Misc. Inf., R. Bot. Gdns., Kew,* no. 6, 1922, pp. 189–193, 6 figs.

Phloeosinus thujae, Perris, is recorded apparently for the first time in Britain. During 1921 it seriously affected the health of many trees at Kew, including specimens of *Thuja orientalis* 40 to 50 years old. During July it was also found on *Cupressus pisifera* about half a mile from the original infestation. The other species are *Scolytus destructor*, Ol. (large elm bark-beetle), abundant in elms, especially during 1921 ; *S. multistriatus*, Marsh. (small elm bark-beetle), found together with *S. destructor* and *Magdalis armigera*, F. (elm bark weevil) ; *S. pruni*, Ratz. (large fruit-tree bark-beetle), in *Prunus laurocerasus*, *P. padus*, and a hawthorn log ; *S. intricatus*, Ratz. (oak bark-beetle), common in various oaks and sweet chestnut ; *S. rugulosus*, Ratz. (small fruit-tree bark-beetle), common in various fruit trees and *Prunus padus* ; *Hylesinus fraxini*, Panz. (ash bark-beetle), in *Fraxinus* and lilac (*Syringa vulgaris*) ; *H. vittatus*, F., in elm with *Magdalis armigera* ; *Myelophilus piniperda*, L. (pine-shoot beetle) ; *Hylurgops palliatus*, Gyll. (brown pine beetle), in pine and spruce logs ; *Hylastes ater*, Payk. (black pine beetle), in pine logs ; *Dryocoetes villosus*, F., in oak and sweet chestnut ; *Cryphalus fagi*, F. (beech bark-beetle), in beech twigs and branches ; *C. abietis*, Ratz. (fir bark-beetle), in *Abies* spp. ; *Pityogenes bidentatus*, Hbst., in *Pinus* spp. ; *P. chalcographus*, L., in timber (undoubtedly an importation and not yet established) ; *Pityophthorus pubescens*, Marsh., in pine twigs ; *Xyleborus saxeseni*, Ratz., in cherry trees, oak, sweet chestnut, beech and in a *Catalpa* log ; and *Trypodendron domesticum*, L., in oak and beech logs.

[**Notes on Insect Pests.**]—*16th Ann. Rept. British Columbia Dept. Agric., 1921, Victoria,* 1922, pp. U12–U53.

These notes are compiled from the reports of various district inspectors.

The strawberry root weevil [*Otiorrhynchus ovatus*] is becoming less troublesome in Vancouver owing to the better methods adopted by growers. On the lower mainland *Epochra canadensis* (currant-fly) did severe damage to gooseberries, and *Pennisetia* (*Bembecia*) *marginata* (root-borer) and *Oberea bimaculata* caused local trouble on raspberries. A detailed report of campaigns against the codling moth [*Cydia pomonella*] in various districts is given. Some new outbreaks were discovered. Spraying and banding, and the inspection of foreign cars are the measures most generally adopted. *Aspidiotus perniciosus* (San José scale) is still present locally on wild growth, but does not appear to be spreading. Cutting and burning over infested patches of bush has up to the present prevented re-infestation of the orchards, but close watch must be kept for its possible reappearance. *Contarinia* (*Diplosis*) *tritici* (wheat midge) damaged several hundred acres of spring wheat in the Salmon River Valley. Remedial measures are difficult, but an effort was made to have the refuse from the threshers destroyed, thus reducing the numbers of over-wintering pupae. Farmers are advised not to plant wheat crops for several years, or at least only autumn wheat, as this is practically immune. *Eriophyes pyri* (pear-leaf blister mite) increased rapidly in the same district in 1920, but with careful spraying the damage has been lessened. Pears only were attacked. Where the dormant spray (lime-sulphur 1 : 9) was properly applied for two seasons, the pest was practically eradicated. *Anarsia lineatella* (peach-twig borer) entirely spoiled peaches and apricots in some badly kept orchards but caused little trouble elsewhere. *Eriocampoides limacina* (pear and cherry slug) did a certain amount of damage locally, but is not difficult to control. The Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has become established over a considerable area in East Kootenay. The tussock moth [*Hemerocampa* sp.] has appeared in some of the older orchards and was held in check by lead arsenate sprays. Other pests requiring remedial measures were leaf-hoppers, red-humped caterpillar [*Schizura concinna*] and a hawk moth (*Sphinx elegans*). *Heliothis obsoleta* (*armigera*) (corn ear worm) has recently been discovered for the first time in British Columbia.

Ruhmann (M. H.). **Report of the Assistant Entomologist, Vernon.**—*16th Ann. Rept. British Columbia Dept. Agric., 1921, Victoria,* 1922, pp. U69–U73.

The pests that were recorded in addition to those in the preceding paper included *Enarmonia prunivora* (lesser apple worm), which was unusually abundant and caused serious losses to the apple and cherry crops. *Vitula serratilineela* (wax moth), which is generally considered to be a dried fruit insect, occurred in numbers in nearly mature apples, and in combs in bee-hives. *Phorbia* (*Hylemyia*) *brassicae* (cabbage root maggot) was more abundant than usual and caused heavy damage; the few growers who used bichloride of mercury solution against it suffered no loss [*R.A.E.*, A, ix, 582]. A species of *Eriophyes* (probably *E. pyri*) did much injury to apples, and seems to require different treatment from the mite on pears. *Eriosoma lanigerum* (woolly apple aphis),

owing to the mild winter, was able to winter on the trees, and therefore infestation was severe in all sections of the interior. *Anuraphis persicae-niger* (black peach aphis) has recently appeared in Southern Okanagan, and no satisfactory remedy has yet been found for it. *Aegeria exitiosa* (peach-crown borer) was troublesome on peach and prune. *Lepidosaphes ulmi* (oyster-shell scale) was difficult to control in 1921 owing to the unusually long hatching period. The cutworm, *Scotogramma* (*Mamestra*) *trifolii*, seriously damaged vegetable crops and lucerne in various districts and in Kootenay is said to have attacked apple fruit.

Hemerocampa pseudotsugata (Douglas fir tussock moth) [*R.A.E.*, A, ix, 321] has now spread through several sections of the interior. *Sitodiplosis* (*Thecodiplosis*) *mosellana* (wheat midge) caused considerable local damage. The larvae of the bud moth, *Eucosma* (*Tmetocera*) *ocellana*, and of the leaf-roller, *Tortrix* (*Archips*) *rosaceana*, were more abundant than usual.

Experiments in the control of *Hylemyia antiqua* (onion maggot) [*R.A.E.*, A, ix, 582] have now been conducted over three years, and the following conclusions have been reached. Poison baits, though causing a high mortality, do not materially prevent oviposition. The trap crops will take the major portion of oviposition of the first generation during the most critical period of growth of the seedlings. There is a partial third generation of the fly in the Okanagan Valley. Thinning should be delayed until 14th–16th June, when all trap onions must be removed and destroyed. Thinning should then be completed as soon as possible, all infested seedlings being pulled up and destroyed. A certain amount of oviposition is sure to occur after removal of the traps ; this will chiefly be on previously injured or weak plants, which should be allowed to remain to act as traps for the rest of the season. From the middle of July onwards the pest is held in check by natural enemies, among which is a Cynipid parasite tentatively identified as *Cothonaspis gillettei*, Wash. The treatment outlined above is not expensive and has proved successful under commercial conditions.

A heavy infestation of cabbages by *Pieris rapae* in early June was completely checked by the use of a dust mixture containing 1 lb. lead arsenate to 20 lb. hydrated lime. Several applications were made before the crop was harvested.

EVANS (H. H.). **Oyster Shell Scale.**—*Agric. Jl. Victoria, B.C.*, vii, no. 7, September 1922, pp. 154–155, 1 fig.

As a result of the unsatisfactory results obtained against *Lepidosaphes ulmi*, L. (oyster-shell scale) with lime-sulphur sprays, experiments have been conducted with ordinary commercial fuel-oil and whale-oil soap in the dilution 1 : 10, and with the miscible oil preparation known as dormoil in the same dilution. The conclusion has been reached that one of these can be used with advantage in the spring months, while the trees are still dormant, but the possibility of injury to the trees must be borne in mind, and it would be well to extend the tests before definite recommendations are made.

VEITCH (R.). **The White Grubs of the Sugar-cane Soils of Fiji.**—*Colonial Sugar Refining Co., Ltd., Sydney*, Agric. Rept., no. 5, March 1922, 14 pp., 4 plates. [Received 18th September 1922.]

The bulk of the information contained in this paper has been previously noticed [*R.A.E.*, A, viii, 25].

BEESON (C. F. C.). **The Food-plants of Indian Forest Insects, Part vii.**—*Ind. Forester, Allahabad,* xlviii, no. 9, September 1922, pp. 494–500.

This continuation of lists previously noticed [*R.A.E.*, A, ix, 426, etc.] deals with the Scolytids: *Carphoborus costatus*, Eichh., in *Pinus excelsa* and *P. longifolia*; *Crypturgus pusillus*, Gyll., in *Abies webbiana*, *Cedrus deodara*, *Pinus excelsa* and *P. longifolia*; *Dryocoetes indicus*, Steb., in *Abies webbiana*, *Picea morinda*, *Pinus excelsa* and *P. longifolia*; *Eccoptopterus sexspinosus*, Mot., in *Shorea robusta*; *Ips longifolia*, Steb., in *Abies webbiana*, *Cedrus deodara*, *Pinus excelsa*, *P. gerardiana* and *P. longifolia*; *Pityogenes scitus*, Bldfd., in *Cedrus deodara*, *Picea morinda*, *Pinus excelsa* and *P. gerardiana*; *Polygraphus longifolia*, Steb., in *Pinus longifolia*; *P. pini*, Steb., in *Abies webbiana*, *Cedrus deodara*, *Picea morinda* and *Picea excelsa*; *Sphaerotrypes globulus*, Bldfd., in *Anogeissus latifolia*, *Lagerstroemia parviflora*, *Shorea robusta* and *Terminalia tomentosa*; *S. siwalikensis*, Steb., in *Shorea robusta* and *S. assamica*; and *Strophinocerus minimus*, Hagd., in *Prunus armeniaca* (apricot).

BREMER (M.). **Importancia de los Pies inatacables por el Pulgón lanudo en las Plantaciones de Manzanos en la Argentina.** [The Importance of Stocks resistant to the Woolly Aphis in the Apple Orchards of Argentina.]—*Anales Soc. Rur. Argentina, Buenos Aires,* lvi, no. 15, 1st August 1922, pp. 398–400.

Many Argentine fruit-growers are deterred from undertaking apple cultivation, in spite of its many economic advantages, owing to the losses caused by the woolly aphis [*Eriosoma lanigerum*]. The use of stocks resistant to this pest is advocated as a solution of this problem.

VAYSSIÈRE (P.). **Propriétés insecticides de la Chloropicrine: leur Utilisation dans la Désinfection des Semences de Coton.**—*Agron. Colon., Paris,* no. 56, August 1922, pp. 249–253.

Disinfection of cotton seed attacked by *Platyedra* (*Pectinophora*) *gossypiella* has generally been effected by the heat method as adopted in Egypt. As, however, the growers in French West Africa are desirous of importing certain foreign varieties of cotton, the Institut d'Agronomie Coloniale and the Entomological Station of Paris have been pursuing researches with a view to finding some reliable method of disinfestation that will entail the minimum of expense. In this respect chloropicrin has been found the most useful insecticide. The present stocks, obtained by the Government for war purposes, are available at a very low figure, and the commercial price never exceeds 15 fr. per kilo (about 5*s*. 3*d*. per lb.). This fumigant is used at ordinary temperatures and presents no difficulties of transport or manipulation. Moreover, the loss in germination of treated seed (about 3 per cent.) is negligible. A dose of 30 grammes per cu. metre (about 1 oz. per 35 cu. ft.), acting for 24 hours in a closed receptacle or room, is sufficient for complete disinfestation. Investigations are in progress to determine the further possibilities of this gas as an insecticide. In manipulating large quantities of the gas, the use of a gas mask is advised.

Ravaz (L.). **Les Galles phylloxériques.**—*Progres Agric. et Vitic., Montpellier*, lxxviii, no. 38, 17th September 1922, pp. 271–272.

The galls produced by *Phylloxera* on vines are described, and Balbiani's paint is recommended for controlling infestation [*R.A.E.*, A, ix, 499].

Leefmans (S.). **Verspreiding van den Bessenboeboek door den Loewak** (*Paradoxurus hermaphroditus*, **Pall.**) **(tjareuk, moesang).** [The Diffusion of the Coffee-berry Borer by *Paradoxurus hermaphroditus*.] —*Algemeen Landbouwweekblad Ned.-Indië, Bandoeng*, vii, no. 6, 11th August 1922, p. 239.

An examination of about 5¾ lb. of coffee seed in the excreta of *Paradoxurus hermaphroditus* showed that about 1 per cent. was infested by the coffee-berry borer [*Stephanoderes hampei*], and included 8 dead adults, 11 newly emerged adults, 8 old adults, 33 living pupae, 62 living larvae and 17 eggs. Feeding experiments made by Dr. Dammerman confirm this, and show that all stages of the beetle can pass unharmed through the intestinal canal of this animal, which is thus a factor in spreading the pest.

Hase (A.). **Biologie der Schlupfwespe** *Habrobracon brevicornis*, **Wesmael (Braconidae). Zugleich ein Beitrag zur Frage der biologischen Bekämpfung von Schadinsekten.** [The Biology of *H. brevicornis*. A Contribution to the Question of the Biological Control of Injurious Insects.]—*Arb. Biol. Reichsanst. Forst- u. Landw., Berlin*, xi, no. 2, 1922, pp. 95–168, 33 figs.

These investigations on *Habrobracon brevicornis*, Wesm., were made from August to December 1921, being prompted by the occurrence of this Braconid in broods of the meal moth [*Ephestia kühniella*, Z.].

The breeding of *H. brevicornis* in large numbers is possible if full-grown larvae of *E. kühniella* are available, as it is not limited to any particular season. Fertilised, unfertilised and sterile eggs are laid. The fertilised eggs produce females and the unfertilised ones males. They are laid on crippled larvae or close to them. At 32°–34° C. [89·6°–93·2° F.] the first larvae appear in half a day; at a room temperature of 18°–21° C. [64·4°–69·8° F.] two days, and at 16° C. [60·8° F.] five days are required. Low temperatures, 4°–14° C. [39·2°–57·2° F.] retard hatching up to eight days. Three moults occur, so that there are four larval stages. The larva sucks crippled and dead meal moth larvae; hitherto it has been incorrectly described as an ectoparasite. According to the temperature the larval stage lasts 1½–5 days. The pupal stage is preceded by a pre-pupal one, and varies from 3 days at 32° C. [89·6° F.] to 14 days at room temperature [64·4°–69·8° F.], while cool weather may prolong it to 30 days. The proportion of males to females was found to be as 3 to 2. Both sexes feed on the host larvae, but the eggs, pupae and adults of *E. kühniella* are not attacked, and the larvae only when they are at least 5–6 millimetres long. The females can produce males parthenogenetically for 40 days, and may then be fertilised normally. The females do not oviposit unless host-larvae of at least 10 millimetres long are present, and unless the temperature is at least 15° C. [59° F.]. The maximum number of eggs per female was 317. Under favourable conditions about 60 per cent. of the deposited eggs give rise to adults

capable of reproduction. Several generations can occur in a year, and at high temperatures a new one can appear in seven days. *H. brevicornis* has a more rapid sequence of generations than *E. kühniella*; at a constant temperature of 25° C. [77° F.] it is 7–8 times as rapid.

The economic value of this parasite is therefore considerable, though a relatively high degree of warmth is required, development being slow under 64° F., and oviposition ceasing in cool weather. *H. brevicornis* cannot be employed as the sole means for controlling *E. kühniella*, but, provided that the Braconid is properly bred and liberated, it can prove a useful auxiliary in retarding the increase of the meal moth, so that long intervals may elapse between the dates when fumigation is required.

SCHULZE (H.). **Beiträge zur Biologie von** *Tyroglyphus mycophagus* **(Mégnin). (Zerstörung einer Mehlwurmzucht durch diese Milbe.)** [Contributions to the Biology of *T. mycophagus*. The Destruction of a Brood of *Tenebrio molitor* by this Mite.]—*Arb. Biol. Reichsanst. Forst- u. Landw., Berlin*, xi, no. 2, 1922, pp. 169–177, 6 figs.

In the hypopial stage *Tyroglyphus mycophagus*, Mégn., uses insects, in this case *Tenebrio molitor*, as a means of transport for the purpose of reaching new feeding-places. As many as 700 mites may occur on one beetle.

The adults and eight-legged nymphs of *T. mycophagus* parasitise the larvae, pupae and adults of *T. molitor*, first attaching themselves at points where they cannot be brushed off and then penetrating into the host. The eggs of *T. molitor* are laid in positions so dry that they are not subject to attack.

Another mite, *T. longior*, Gerv., was also found in the bran used in breeding *Tenebrio*, but appeared to limit its attack to dead adults and pupae. *T. longior* does not possess the caustic secretion that enables *T. mycophagus* to attack successfully the pupae and larvae of the beetle.

SCHULZE (H.). **Die Bekämpfung von** *Tyroglyphus mycophagus* **(Mégnin).** [The Control of *T. mycophagus*.]—*Arb. Biol. Reichsanst. Forst- u. Landw., Berlin*, xi, no. 2, 1922, pp. 179–184.

In testing methods against *Tyroglyphus mycophagus*, Mégn., infesting an experimental brood of *Tenebrio molitor* [see preceding paper], all stages of the mite were destroyed by exposure for three hours to Zyklon (a derivative of hydrocyanic acid), 15 cc. per cu. m., or for two hours to chloropicrin, 10 cc. per cu. m. Both strengths were, however, fatal to *T. molitor*, so that fumigation proved unsuitable. Desiccation was more successful, the damp bran containing *T. molitor* and the mites being dried by simple exposure in a warm room at 23°–25° C. [73·4°–77° F.] for 5–6 days.

Points to be noted are that a brood of *T. molitor* may become infested with mites if even a single beetle carrying the hypopial stage of the mite is introduced, and that if damp bran is placed with dry bran any mites present in the latter will be attracted. This indicates a means for detecting mite-infestation in flour and bran in which no larvae, nymphs or adults can be seen.

BAUNACKE (W.). **Untersuchungen zur Biologie und Bekämpfung des Rübennematoden** *Heterodera schachtii*, **Schmidt.** [Investigations into the Biology and Control of the Beet Nematode, *H. schachtii*.]—*Arb. Biol. Reichsanst. Land- u. Forstw., Berlin,* xi, no. 3, 1922, pp. 185–288, 5 plates, 2 tables.

Nematode infestation is of great economic importance in Germany because of the too intensive cultivation of beet, and because *Heterodera schachtii*, Schmidt, threatens to spread to other valuable field crops. A comparatively simple and rapid method of ascertaining the presence of Nematodes in soil consists of determining the cyst content of the ground at various depths. The upper 12 in. of the soil provide the Nematode with the most favourable conditions for most of the year, but in heavily infested fields cysts may be found down to about 32 in. below the surface. The deep-lying cysts are responsible for lasting infestation, while those near the surface serve to spread and rapidly increase the pest. To obtain soil samples, trenches about 39 in. deep are dug in various parts of the field. Samples of soil taken at 16 in. are mixed together, and a sample is spread on paper and allowed to dry for a day. It is then placed in a dish, and after sufficient water to reach the edges of the dish has been added, the whole is stirred and allowed to stand. The brown cysts then appear at the surface, though later on they sink. Samples of soil are also taken from the trenches at other depths and treated in the same way.

The larvae that hatch from the cysts make their way to the food-plant, and this habit permits the use of simple baits to ascertain their presence and to test the effect of remedial measures. A bait is prepared by placing about $3\frac{1}{2}$ oz. of sand (washed quite clean) on a piece of rag 6 in. square. About $\frac{1}{3}$ oz. of beet seed is placed on the sand and the corners of the rag are gathered up and tightly bound round the end of a stick, sufficient space being allowed in the bag thus formed to permit the seed to swell. A number of bags are buried in the field, the projecting sticks indicating their positions. When numerous rootlets penetrate the fabric, the bag must be carefully lifted, freed from all adhering earth and emptied into a clean container. If water is poured on, stirred and passed through a sieve before complete settling has occurred, the sand will remain in the container, the rootlets will be held in the sieve, and the Nematodes can be examined. A general idea of the effectiveness of the bait can thus be gained, but microscopical examination is necessary to differentiate between *H. schachtii* and other Nematodes. This bait method enables the food preference of the established Nematode strain to be determined before planting, so that choice in crop rotation can be made accordingly.

The behaviour of the active larva is governed by chemical and thermal stimuli. The optimum soil temperature is about 25° C. [77° F.]. The larva is guided to its food-plant by its sensitiveness to the water-soluble products of metabolism of the roots of the plant. This sensitiveness becomes specialised to the root secretions of a given plant, and the Nematode strains thus formed do not readily attack other plants. The embryo within the egg and the larva lying latent within the cyst are also susceptible to the same stimuli, and by the use of these, cysts can be induced to give rise to larvae in a few weeks instead of in the normal period of a few years. Some few of the descendants of a highly specialised strain of *Heterodera* remain capable of general adaptation, and ensure the continuance of the species under changed conditions. Measures must be directed against the cysts. As the

majority of them occurs near the surface, they must be destroyed by means of soil disinfection. The development of the deep-lying cysts that cannot be reached in this manner must be hastened by sowing repeatedly plants exercising a stimulating action. The brood will then perish for lack of food-plants if the field is left fallow after the ground has been broken up.

KAUFMANN (O.). **Ueber das Vorkommen von zwei Generationen bei Kohlerdflöhen.** [On the Occurrence of two Generations in Cabbage Flea-beetles.]—*Nachrichtenblatt deutsch. Pflanzenschutzdienst, Berlin,* ii, no. 9, 1st September 1922, pp. 73-74.

Observations in 1922 indicate that *Phyllotreta undulata* has two generations a year in the Naumburg region. Previous mention of more than one generation is found in the older literature, but as flea-beetle larvae were first studied by Börner and Blunck [*R.A.E.*, A, ix, 138, 547], such statements appear to have been based on supposition only. Blunck believed that *P. undulata* leaves its winter quarters later than *P. nigripes* and *P. atra* and takes longer to become mature. The author, however, found that whereas *P. undulata* had left its winter quarters by 18th April, the last individuals of *P. atra* only did so on 30th May; while an examination of both species on 28th April showed that 72 per cent. of the females of *P. undulata* were ready to oviposit and none of *P. atra*. The latter matured later, 86 per cent. of the females being ready to oviposit on 10th June. The appearance of the new brood agrees with the above conditions. By 7th July females of *P. undulata* were fully mature and many were already fertilised.

WILKE (S.). **Die Runkel- oder Rübenfliege** (*Pegomyia hyoscyami*, **Panz.**). [The Beet Fly, *P. hyoscyami*.]—*Beilage, Nachrichtenblatt deutsch. Pflanzenschutzdienst, Berlin,* ii, no. 9, 1st September 1922, 2 pp., 4 figs.

This leaflet briefly describes the habits and control of the beet fly, *Pegomyia hyoscyami*, Panz. In Germany two or three broods occur in a year according to the climate. The most serious damage is done by the larvae of the first generation, because the plants are young and tender and have more difficulty in overcoming the injury. All infested leaves must be collected and burned, and if the heart of the plant is uninjured, a liberal top dressing of ammonium sulphate or sodium nitrate will repair the damage. Thinning out should be delayed until the larvae appear, and all infested plants must be collected and destroyed. In sunshine the larvae die if the plants are left to wither on the ground. After harvesting, the ground must be ploughed to a depth of at least 15 in. so as to destroy the hibernating pupae. Early-sown beet seems to suffer more than late-sown. A Braconid, *Opius nitidulator*, Nees, parasitises the larvae and may prove very useful. Birds, especially starlings, also destroy many larvae.

WILL (J.). **Die wichtigsten Forstinsekten.** [The most important Forest Insects.] Second edition, completely revised by M. WOLFF and A. KRAUSSE—*Neudamm*, J. Neumann, 1922, xvi + 209 pp., 203 figs. Price 440 marks plus 200 per cent.*

The first edition of this elementary text-book for forestry students was published in 1905. While leaving the original division of the text

* The *Nachrichtenblatt für den deutschen Pflanzenschutzdienst* gives the price as 50 Marks plus 200 per cent.

into sections on beneficial, slightly harmful and distinctly injurious species, the revisers have practically rewritten the contents. The nomenclature has been brought up to date, and the biology of the various species has been made a special feature. Remedial measures are dealt with briefly, only those of known practical value being considered.

HEGH (E.). **Les Termites. Partie générale. Description.—Distribution géographique.—Classification.—Biologie.—Vie sóciale.—Alimentation.—Construction.—Rapports avec le Monde extérieur.** —*Brussels*, Imprim. Indust & Financière, 4, Rue de Berlaimont, 1922, 756 pp., 460 figs., 1 map.

Many of the sections of this excellent compilation of the information at present known regarding termites and their habits in various parts of the world have previously been noticed [*R.A.E.*, A, ix, 521 ; x, 184, 284, 425]. The last one included in this work deals with the relations between one termite colony and another, and with predacious enemies, parasites, other insects living with the colony, the vegetation covering the termitaria and the inter-action of geological conditions and the occurrence of termites. The influence of such external factors as light, heat and humidity on the insects is discussed. An extensive bibliography is given.

WOLFF (M.) & KRAUSSE (A.). **Die forstlichen Lepidopteren.** [Forest Lepidoptera.]—*Jena*, Gustav Fischer, 1922, viii + 337 pp. Price 8 marks ; bound, 11 marks.

This volume serves the double purpose of a work of reference and of a text-book. As the former it should assist the professional entomologist, advanced forester, student, and all interested in entomology. As a text-book the monographic descriptions of the biology of the important forest pests are designed to help beginners, especially students. The species dealt with include all those mentioned since the publication, in 1837, of Ratzeburg's " Forest Insects."

The first section deals with classification, morphology, development and physiology. There is a list of authors on forest Lepidoptera and their parasites, a bibliography, and a chapter on biological formulae.

The second part contains a systematic biological review of all Central European forest Lepidoptera and the life-histories of the more important species, with information regarding their food-plants, control and natural enemies. The pests are arranged in a series of tables under their food-plants, with subdivisions according to the parts attacked.

A botanical supplement includes a classified list of the important forest plants.

Such works on general zoology, entomology, and forest-protection as provide a useful help to the student are included in a bibliography, and the volume seems well adapted to the purpose for which it has been planned.

HORVÁTH (G.). **Ueber eine dem Tabak schädliche Hemipteren-Art aus Sumatra.** [A Species of Rhynchota from Sumatra injurious to Tobacco.]—*Konowia, Vienna*, i, pt. 4–5, 1922, pp. 173–176, 1 fig.

The Capsid previously recorded as *Gallobelicus nicotianae*, Koningsberger [*R.A.E.*, A, vii, 251, 538] is now referred to the genus *Dicyphus*, Fieb. A redescription of it is given in Latin, and it is compared with *D. orientalis*, Popp., and *D. minimus*, Uhl.

LEEFMANS (S.). **Voorloopige Mededeelingen omtrent Koffiebessenboeboek.** [Preliminary Communications on the Coffee-berry Borer.]—*Publicaties Ned.-Indisch Landbouw Syndicaat, Soerabaya,* xii, no. 15, 11th September 1920, pp. 645–663. (Not on sale.) [Received 20th October 1922.]

The author's investigations were especially directed towards elucidating the biology of the coffee-berry borer [*Stephanoderes hampei*], thus completing Dr. Roepke's study [*R.A.E.*, A, viii, 447]. The egg stage lasts 5–6 days. The larvae feed upon the tissues of the coffee bean; young individuals may also feed on borings and on saprophytic fungi in the beans. The larval stage lasts 10–21 days, with an average of 14, including a 2-day rest prior to pupation. The pupal stage lasts 4–6 days. The duration of a generation is, therefore, 20–35 days, with an average of 25. The maximum life of an adult female was observed to be 87 days. The maximum number of eggs laid by one female was 54. Females predominate, the percentage of males being from 0·23 to 5 with an average of 1·7 per cent. Unfertilised eggs do not hatch. The males cannot fly and are sought out by the winged females, which seek new breeding-places after mating. Mating nearly always occurs in the black, dry berries, which mostly have fallen to the ground and are almost exclusively the haunts of the males. Breeding seldom occurs in young berries.

The preventive measures advised are the avoidance of all coffee seed likely to be infested and the provision of harvesting baskets, etc., with rounded corners permitting of thorough cleansing. Other measures are the immersion of harvested berries in water for 3–4 days, the burying (at least 8 inches deep under well packed soil) or burning of the highly dangerous blackened berries, and "rampassen," *i.e.* the removal of all berries large enough to invite attack.

CORPORAAL (J. B.). **De Koffiebesboorder op Sumatra's Oostkust en Atjeh.** [The Coffee-berry Borer on the East Coast of Sumatra and in Atjeh.]—*Meded. Algem. Proefst. A.V.R.O.S., Medan,* Algem. Serie no. 12, 1st June 1921, 20 pp. (With a Summary in English.) [Received 20th October 1922.]

This paper is intended to complete the information previously published by Dr. Roepke [*R.A.E.*, A, viii, 447] and Leefmans [see above], and contains a summary of their results.

The borer was probably introduced into Sumatra from Java, thus again demonstrating the urgent need for plant quarantine legislation in the Dutch East Indies.

When the injury first became important (January 1919) the beetles were only found in dry berries, either on the bushes or on the ground, and they then limited their attack to the dry pulp round the bean. The first attacked bean was found in August 1919, and up to July 1920, such beans were very scarce. Breeding can occur in prepared market coffee, especially if it is not too dry.

The infestation is now nearly universal on the east coast of Sumatra. At Siantar the proportion of infested berries varied from 5 to 99 per cent. New infestations on isolated estates seem due to natives bringing infested beans or coffee for domestic use.

Blackened berries that are not buried or burned should be at once artificially dried at 50°–60° C. [122°–140° F.], which kills the beetles. The intervals between picking the ripe berries should be shortened; the ideal would be to harvest once a week.

EGGERS (I. H.). **Kulturschädliche Borkenkäfer des indischen Archipels.** [Bark-beetles of the Indian Archipelago injurious to Cultivated Plants.]—*Ent. Ber. Ned. Ent. Vereen., Amsterdam*, vi, no. 126, 1st July 1922, pp. 84–88. [Received 19th September 1922.]

These investigations were made on bark-beetles injurious to coffee, sent to the author for identification by Mr. J. B. Corporaal from Sumatra.

The material included numerous specimens of the coffee berry borer as dealt with by Mr. Corporaal in his recent publication [see preceding abstract] and Dr. Roepke in 1919 [*R.A.E.*, A, viii, 447]. The species in question is considered to be *Stephanoderes coffeae*, Hgd., which the author does not treat as a synonym of *S. hampei*, Ferrari. It has longish, stiff bristles on the elytra, whereas Ferrari definitely described the bristles as consisting of wide, short scales [*cf. R.A.E.*, A, viii, 448]. *S. coffeae* was described by Hagedorn from East Africa, and also occurs in the Congo. In a communication to the author Mr. Corporaal mentions an apparent attempt of the borer to adapt itself to *Tephrosia candida* grown for green manure, and he believes that caution is needed as regards this plant.

A second, smaller species fairly often found in coffee beans in Sumatra is *Stephanoderes arecae*, Hornung, known as a pest of the betel nut. This occurrence in coffee is a new record. It has been taken from Javanese tree fungi and was then (1905) described as new by the author under the name *S. fungicola*, which becomes a synonym.

Under the name *Xyleborus coffeae* Dr. Wurth has recorded a twig-borer of coffee from Java. A similar species with similar habits found in East Africa is *X. morstatti*, Hgd. The twig-borers from the east coast of Sumatra submitted to the author prove to be the latter, and not the Javanese *X. coffeae*, Wurth, which is yellow and short, while the Sumatran and African specimens are blackish brown and long. Mr. Corporaal found *X. morstatti* in oil palm, *Elaeis guineensis*. It will be interesting to know if either of these two species occurs on other islands of the Archipelago and to which of them the coffee twig-borer in Tonkin belongs.

A beetle found by Corporaal in betel nuts proves to be *Coccotrypes integer*, Eichh. It attacks various seeds and has been recorded by Blandford from those of ebony, *Diospyros ebenum*.

In 1903, E. E. Green reported a shot-hole borer very injurious to tea in Ceylon. Blandford had mentioned the same beetle in 1896 from Ceylon. Both writers use the name *Xyleborus fornicatus*, Eichh., and Blandford compared his examples (from India and Ceylon) with Eichhoff's type. Even here, however, the identification is not certain. The author has examined specimens sent from Peradenyia by Mr. Green to Dr. Hagedorn. They agree with Green's description (*Circulars and Agricultural Journal Royal Botanic Gardens, Ceylon*, ii, no. 9, December 1903), but not with Eichhoff's type, now in the author's possession. It is therefore described as *Xyleborus fornicatior*, sp. n.; the differences between it and *X. fornicatus* will be given in a publication on the Scolytids of the Archipelago.

A specimen of *Xyleborus fornicatus*, Eichh., in the Hagedorn Java collection is recorded as taken from *Hevea* attacked by a fungus. It must therefore be watched as a possible pest of rubber in association with the fungus.

Other beetles collected in *Hevea* by Mr. Corporaal include *Xyleborus perforans*, Woll., already known as a pest of this rubber, *X. submarginatus*, Blfd., and *X. corporaali*, sp. n. Nothing is known about the last-named except that the attack is found at points where some injury has occurred to the bark.

CORPORAAL (J. B.). **Over** *Necrobia rufipes*, **deG.** [Notes on *N. rufipes*.]—*Ent. Ber. Ned. Ent. Vereen., Amsterdam*, vi, no. 126, 1st July 1922, pp. 93-94. [Received 19th September 1922.]

During a voyage from the Dutch East Indies to Europe in November 1921 thousands of the red-legged ham beetle, *Necrobia rufipes*, DeG., infested the vessel from a cargo of copra. They devoured various foodstuffs, and even attacked stearine candles. The adults were attracted by lamps.

SMITS VAN BURGST (C. A. L.). *Habrobracon brevicornis*, **Wesm., faunae n. sp.**—*Ent. Ber. Ned. Ent. Vereen., Amsterdam*, vi, no. 127, 1st September 1922, pp. 106-108.

This is the first record of *Habrobracon brevicornis* from Holland. It is an important parasite of the meal moth, *Ephestia kühniella*, Z., and is easily bred [*R.A.E.*, A, x, 566].

WATERSTON (J.). **On Chalcidoidea. (Mainly bred at Dehra Dun, U.P., from Pests of Sal, Toon, Chir and Sundri.)**—*Indian Forest Records, Calcutta*, ix, pt. 2, 1922, pp. i-iv & 51-94, 23 figs.

In the introduction to this paper a list is given by Mr. C. F. C. Beeson of the hosts of the parasites dealt with arranged under their respective orders, with their food-plants.

The parasites in question include :—*Chalcis tachardiae*, Cam., and *C. hearseyi*, Kirby, var. *xanthoterus*, n., bred from the pupa of *Hypsipyla robusta*, Moore ; *Trigonura* (*Centrochalcis*) *ruficaudis*, Cam., bred from sundri (*Heritiera fomes*) attacked by a Buprestid, *Chrysobothris* sp., in company with a Lamiid, *Glenea* sp., and the Cerambycids, *Derolus discicollis*, Gah., and *Diorthus simplex*, White ; *T. tenuicaudis*, sp. n., bred from *Heritiera fomes* attacked by *Glenea* sp., the Anthribid, *Ozotomerus maculosus*, Perr., and *Chrysobothris* sp., and probably parasitic on the last named; *Antrocephalus destructor*, sp. n., and *A. renalis*, sp. n., from *Hypsipyla robusta* attacking toon (*Cedrela toona*); *Monacon productum*, gen. et sp. n., bred from *Diapus furtivus*, Samps., infesting sal (*Shorea robusta*) ; *M. abruptum*, sp. n., bred from *Platypus uncinatus*, Blfd., in *Heritiera fomes*; *Oedaule stringifrons*, gen. et sp. n., from the Bruchid, *Pachymerus* (*Caryoborus*) *gonagra*, F., in seeds of *Albizzia lebbek*; *Roptrocerus sulcatus*, sp. n., bred from pupal chambers of *Ips longifolia*, Stebb., in galleries under bark of chir pine (*Pinus longifolia*) ; and *Tetrastichus spirabilis*, sp. n., from the Pyralid, *Hypsipyla robusta*.

GATTEFOSSÉ (J.). **Le Pyrèthre de Dalmatie et sa Culture.**—*Rev. Bot. app. & d'Agric. colon., Paris*, ii, Bull. 12, 31st August 1922, pp. 397-402.

A general account is given of Dalmatian pyrethrum (*Chrysanthemum cinerariaefolium*) and of the best methods of cultivating it.

JUILLET (A.). **Essais de Culture et Cultures industrielles du Pyrèthre de Dalmatie.**—*Rev. Bot. app. & d'Agric. colon., Paris*, ii, Bull. 12, 31st August 1922, pp. 402–408.

The history of the cultivation of pyrethrum in France, and the methods employed by various growers, with the advantages gained by experience up to the present time, are discussed. The active properties of pyrethrum flowers cannot be estimated by the weight of the extract nor by the valuation of the pyrethron; the only point to be considered is the physiological dose, whether powder or the insecticide products obtained from the flowers are used. An insecticide with a medium degree of activity, diluted to the prescribed titration and sprayed lightly over a large Pierid caterpillar, should kill it within fifteen minutes, and should be equally toxic to the vine moths [*Clysia ambiguella* and *Polychrosis botrana*]. The active properties of pyrethrum flowers disappear rapidly in keeping; they cannot be considered effective after three months. The choice of an emulsifier is also an important consideration. Experience with resinous black soap has proved that it does not in any way alter the insecticidal properties of the oleoresin of pyrethrum when used as an emulsifier, and such a soap emulsion can be kept for a year without in any degree losing its insecticidal value. Other emulsifiers providing stable solutions are the sulphonated salts of fatty acids (such as sulphoricinates), saponins, agar-agar, glycerine, etc., either alone or in combination [see also *R.A.E.*, A, x, 346]. The wetting properties and the surface tension of the dilutions must be studied. It has been observed that dilutions of 1 : 10 of the pyrethrum soap were only slightly toxic to Pierid larvae; the toxicity increased at dilutions of 1 : 100 to 1 : 500, to decrease again with further dilution to 1 : 1,000 and disappear entirely at 1 : 2,000, corresponding to a dilution of oleoresin in the strength of 1 : 200,000. These results are undoubtedly due to problems of surface tension, which probably varies with the species under treatment.

LESNE (P.). **Régime et Dégâts des Coléoptères xylophages du Genre** *Lyctus*.—*Rev. Bot. app. & d'Agric. colon., Paris*, ii, Bull. 12, 31st August 1922, pp. 418–420.

A study has been made of the samples of wood in the collections of the Laboratory of Colonial Agronomy, Paris, with a view to discovering the species that are attacked by xylophagous Coleoptera, and to determine the kinds of wood that had harboured colonies of Lyctids. The latter beetles attack dead wood, but confine themselves to soft wood or the sapwood of the harder varieties. Two species of Lyctids were found to have been at work, namely, *Lyctus brunneus*, Steph., of which a list of 25 food-plants is given, from Indo-China, Gaboon, and the Ivory Coast, and *L. africanus*, Lsn., noted in four species of wood from Senegal and the French Sudan. These lists show that while tropical, humid countries with heavy forest vegetation are favourable to *L. brunneus*, the regions in the neighbourhood of the Sahara, with their relatively dry climate, are more suitable for *L. africanus*. *L. brunneus* has polyphagous habits, but resinous wood is not attacked by either species. Infestation is marked by the presence of small circular or oval holes, surrounded by a fringe of sawdust. When several generations have been at work on a piece of wood, it is reduced entirely to sawdust under a very thin superficial crust, which gives way under the slightest pressure. Washes of paraffin or terebenthine or fumigation with sulphur or carbon tetrachloride, if carefully done,

will check attacks. Immersion of the wood in water for some weeks also prevents the attacks of Lyctids. It is hoped that the damage done by these insects may be more simply obviated by the choice of those varieties of timber that are immune from attack.

L'Apparition du Doryphora de la Pomme de Terre [*Leptinotarsa decemlineata*, **Say**] **en France.**—*Rev. Bot. app. & d'Agric. colon., Paris,* ii, Bull. 12, 31st August 1922, pp. 430–434.

This information has been largely drawn from a note by Dr. J. Feytaud and from the work of Dr. P. Marchal, a good deal of it having been already noticed from other sources [*R.A.E.*, A, x, 536, 537]. The history of previous introductions of this beetle into Europe is sketched, and the legislation recently passed in France as a result of its appearance is quoted. A general account of the beetle and its life-history is given. The experiments of Feytaud and Monteil have led to certain conclusions, which are outlined. Spraying should be done under high pressure, and it is not sufficient to poison the leaves only, as the larvae can survive on the stalks and stems, whence they will reappear on the new growth. Both adults and larvae are repelled by distasteful food and will leave it for neighbouring weeds on which they subsist until fresh potato shoots have grown; this is noticeable when Bordeaux mixture alone is used, without any arsenical. The addition of attractive substances, such as molasses, however, incites more active feeding on the poisoned foliage; this should be borne in mind for future treatments. A dose of 5 : 1,000 of lead arsenate obtained by the reaction of anhydrated sodium arsenate (2 : 1,000) and of neutral lead acetate (1 : 1,000) is much less efficacious and has much slower action against *L. decemlineata* than anhydrated sodium arsenate (2 : 1,000) alone. Lead arsenate at this strength is not efficacious, as the action of the poison is not sufficiently rapid to destroy the mature larvae before their pupation, especially as they do not feed much during this period. The dose must therefore be doubled to about 7½ lb. per 100 gals., or 15 lb. of commercially prepared powder. Strict watch is being kept for new centres of infestation, which continue to appear in spite of all precautions, and meanwhile treatment with arsenical sprays and other remedial measures are being rigorously carried out.

TILLYARD (R. J.). **Progress of the Work of Breeding and Distribution of** *Aphelinus mali* **in New Zealand.**—*N.Z. Jl. Agric., Wellington,* xxv, no. 1, 20th July 1922, pp. 31–34, 1 fig.

In continuation of the work of colonising *Aphelinus mali*, Hald., in New Zealand [*R.A.E.*, A, ix, 534], special trees have been prepared in the infested localities wherever possible for receiving the parasites, and to be used as secondary distributing centres during the next summer. They are enclosed in a large cage covered with bird-proof wire netting and are also covered with scrim on the roof and windward side. They are kept unsprayed so that the woolly aphis [*Eriosoma lanigerum*, Hausm.] may breed on them in sufficient numbers to allow of a plentiful supply of *A. mali* being reared in the following summer. A table records the dates and numbers of each consignment of *A. mali* sent out from the present distributing centre at the Cawthron Institute, Nelson, showing a total of nearly 3,000, this being a great advance on the previous year.

Ordinance No. 8 of 1919. An Ordinance to provide for the Destruction of Plant Pests.—*Seychelles*, 18th June 1919.

Under the terms of this Ordinance, by which the Governor in Executive Council may, by notice published in the Gazette, specify any insects, parasitic plants or fungi as being pests, *Oryctes rhinoceros* is declared to be a pest, and, by a subsequent notice (No. 4 of 1920) a Lymexylonid beetle, *Melitomma insulare*, is placed in the same category.

SWAINE (J. M.). **The Spruce Budworm in Quebec Province.**—*14th Ann. Rept. Quebec Soc. Prot. Plants 1921–22, Quebec*, 1922, pp. 32-39.

A great outbreak of *Tortrix* (*Harmologa*) *fumiferana*, Clem. (spruce or balsam budworm) developed about twelve years ago in the vast forests of the Province of Quebec. The early distribution and gradual extension of this outbreak is described. The infestation gradually died down, disappearing from New Brunswick, almost the last region to suffer, during 1921, and is at present only active in one region, north of Lakes Quinze and Temiskaming stretching into Ontario. The danger now is chiefly from fires, which spread rapidly among the dead and dying trees that are left, and from the insects that follow the primary infestation and cause secondary damage. These are *Pityokteines sparsus*, Lec. (balsam bark-beetle), which breeds in balsam slash and dying and weakened trees, but rarely, if ever, attacks healthy trees, and *Pissodes dubius*, Rand. (balsam bark weevil), which does not oviposit in dry trees or old slash, but attacks weakened or not very healthy trees. The sap rot fungus (*Armillaria*) also kills off many infested trees.

All possible information has been obtained regarding the factors that determine the rise and fall of budworm attack so that all precautions may be taken against the next outbreak, which will probably not occur for many years. By that time, the percentage of balsam in Quebec forests will be much higher than during the last attack, and therefore it will be essential to have a heavy stand of growing trees, without large areas of mature and overmature timber. All dead, dying or mature balsam should be used as rapidly as is possible. Trees attacked by the secondary pests are generally killed within a year, severely damaged trees showing infestation by turning red at the top. These should be cut down during the winter and put into water in early spring in order to prevent the spread of infestation. Slash should be burnt to destroy *P. sparsus* and other boring insects and injurious fungi. These, however, are only accessory measures of control. Direct remedial measures are almost impossible over such a vast area. The application of poison dust by hydro-aeroplane in the initial stages of infestation may be feasible in future outbreaks, when some of the present difficulties may have been surmounted. It is also hoped to establish throughout the eastern forests an intelligence system by means of which insect outbreaks may be discovered in their initial stages and investigated, and remedial measures initiated promptly.

DUNN (M. B.). **A Few Points of Interest in connection with Forest Entomology.**—*14th Ann. Rept. Quebec Soc. Prot. Plants 1921-22, Quebec*, 1922, pp. 42–43.

It is estimated that in New Brunswick alone, where the main forest block covers approximately 100 square miles, the loss in timber due

to the spruce or balsam budworm [*Tortrix fumiferana*, Clem.] in the recent outbreak [see preceding paper] was about 10,900,000,000 merchantable cu. ft. of balsam and 1,087,000,000 cu. ft. of spruce. The total forest area of Quebec and Ontario is many times larger than this, large portions of it being virgin territory for which these figures would be too small. As a factor in experimental investigation, the value of sample plots, where the numbering of trees makes their annual location easy, is pointed out, as it is only when all facts of the life-history and habits of an insect pest are thoroughly known that successful remedial measures can be planned.

LOCHHEAD (W.) & TAWSE (W. J.). **Experiments on the Control of the Onion Maggot, 1921.**—*14th Ann. Rept. Quebec Soc. Prot. Plants 1921–22, Quebec*, 1922, pp. 43–48, 3 figs.

In these experiments for the control of the onion maggot [*Hylemyia antiqua*] ¼ oz. sodium arsenite was dissolved in 1 gal. boiling water, with the addition of 1 pint cheap molasses, and was applied both in shallow pans placed at regular intervals through the field, into which onions were placed and the mixture poured over them, and also as a spray. About 20 pans were used per acre, each being 1½ in. deep and 6 in. wide, and they were refilled every week for four weeks. This method is based on the fact that the flies do not oviposit until about ten days after emergence, and that they are attracted to sweet substances. There are probably three generations in a year, adults first appearing about mid-May. The larvae, after feeding on the bulbs, pupate in the soil, where they pass the winter. The open pans were found to give very good results, were easy to refill and did not hinder cultivation. The spray was less successful, required more material and was more difficult to apply.

KEENAN (W. N.). **The Distribution of the European Corn Borer in Canada and the United States.**—*14th Ann. Rept. Quebec Soc. Prot. Plants 1921–22, Quebec*, 1922, pp. 48–52, 1 map.

The gradual spread and present distribution of the European corn borer [*Pyrausta nubilalis*, Hb.] in the United States and Canada is outlined, and the present infested area is shown on a map.

MAHEUX (G.). **Some Insects Injurious to Shade Trees in Quebec.**—*14th Ann. Rept. Quebec Soc. Prot. Plants 1921 22, Quebec*, 1922, pp. 62–67.

Leaf-eating insects that have caused much defoliation to shade trees about the city of Quebec in recent years include the tent caterpillars, *Malacosoma americana* and *M. disstria*, which have done a great deal of damage to maples. Feeding on the leaves begins in early June and continues until about the 20th, when the trees are partly or wholly defoliated. In early July the moths fly in great numbers about the lights in the streets. The winter is passed in the egg stage. *Vanessa antiopa* (elm caterpillar) begins feeding on the leaves of elm in late July and extracts all the chlorophyll from the leaves, leaving them yellow and transparent. The larvae feed for about four weeks, and after pupation adults appear from about 20th August to 15th September; after hibernating they deposit eggs during the early spring days on the small branches of elm, willow and poplar. *Hemerocampa leucostigma* (white-marked tussock caterpillar) defoliates poplars,

willows and climbers in Quebec and Montreal during August. The egg-masses are laid on the empty pupal cases attached to the bark of the trunks and branches.

Boring insects include the Cerambycid, *Plagionotus speciosus* (sugar maple borer), the eggs of which are deposited in the bark, the resulting larvae boring into the sapwood. The pupal chamber is constructed at the approach of the second winter close to the corky tissue, and in the following summer the newly developed adult breaks through the thin covering of bark. As the tunnels are mostly vertical, some of the cortical surface dries up and falls, leaving bare the adjacent ligneous layers. The Buprestid, *Agrilus anxius* (bronze birch borer) is a recent introduction. Many larvae can be found making a labyrinth of tunnels in a single tree, which is killed within two or three years. The larva lives one year, and the adult escapes from the tree in the following spring. The Cerambycid, *Saperda calcarata* (poplar borer) is one of a number of poplar borers. The tunnels are made vertically in the sapwood. The larva takes three years to develop. The weevil, *Cryptorrhynchus lapathi* (poplar and willow borer) was introduced some ten years ago, probably from Ontario ; it attacks for preference Carolina poplars, which it frequently kills one year after they are planted.

Essential measures for the preservation of these ornamental trees are clean cultivation, removal of diseased portions and cleaning of the bark. Wood borers can be exterminated with carbon bisulphide, and arsenical solutions should be applied for caterpillar epidemics. In spring and autumn, eggs and cocoons should be collected and immediately burnt. Bands covered with an adhesive applied to the trunks will protect the trees against many caterpillars.

TREHERNE (R. C.). **The Control of Insects liable to be imported in Railway Cars.**—*Canad. Ent., Orillia,* liv, no. 6, June 1922, pp. 121–128.

From an examination of statistics it is evident that 85 per cent. of the codling moth [*Cydia pomonella*, L.] infestation in British Columbia is due to importation either by infested railway cars or infested fruit, the former being the more important of the two. In spite of the willing cooperation of the railway authorities the present method of inspection is inadequate in preventing spread by this means. Various methods of treating the infested cars have been tried, with the result that heat is considered the most satisfactory.

The experiments described show that the larvae and pupae may be readily destroyed by steam heat in the ordinary refrigerator car in fifteen minutes with a final registration of 160° F. with or without ice in the bunkers. Provided that the car is in good repair no damage to the insulation will take place.

HOPPING (R.). **Coniferous Hosts of the Ipidae of the Pacific Coast and Rocky Mountain Regions.**—*Canad. Ent., Orillia,* liv, no. 6, June 1922, pp. 128–134.

An accurate knowledge of the food-plants of Scolytid beetles is most important, particularly as it is highly probable that under endemic conditions certain species will confine their attacks to one species of tree, whereas under epidemic conditions they will attack any of the trees on which they are known to breed. Certain genera are even confined to certain generic groups of trees. In California the genera

Dendroctonus (with one exception) and *Ips*, are found solely on the genus *Pinus*, *Pseudohylesinus* (with one exception) in the firs, and *Phloeosinus* in cypress and redwood. Two species of the last named genus are found in pine, one in Canada, the other in India. The danger of quoting local popular names only for the food-plants is pointed out. In the present paper 92 species of Scolytids are listed, of which 35 are common to British Columbia and California and probably to Oregon and Washington, 24 are found in California and not in British Columbia, and 33 in British Columbia and not in California. The distribution in these two regions depends largely on the distribution of the food-plants. Some of the species, such as *Dendroctonus brevicomis* (*barberi*) or *D. monticolae* (*ponderosae*), extend south through the Rockies to Colorado, New Mexico and Arizona, which may also be the case with several species of *Ips* and *Pityophthorus*.

As regards deciduous trees, *Xyleborus dispar*, F. (*Anisandrus pyri*, Peck.) has been found in apple at Vancouver, and *Leperisinus californicus*, Sw., in olive in California, the latter probably breeding in numerous species of *Ceanothus*. *Alniphagus aspericollis*, Lec., breeds in *Alnus oregona*, and *Trypodendron retusus*, Lec., in *Populus tremuloides*, both in British Columbia and California, but they probably occur wherever the western alders and poplars exist. *Dryocoetes betulae*, Hopk., occurs in *Betula occidentalis* in British Columbia.

LARRIMER (W. H.) & FORD (A. L.). U.S. Bur. Ent. **The Daily Maximum Feeding Period of** *Melanoplus femur-rubrum*.—*Canad. Ent., Orillia*, liv, no. 6, June 1922, pp. 141–143, 2 figs.

As a result of studies on the feeding habits of *Melanoplus femurrubrum* in Indiana, it is considered that in order to obtain the best results from poison bran mash it should be applied about 8.30 a.m., so that it is in a moist condition during the maximum feeding period—from 10 a.m. onwards.

DAY (F. H.). *Dermestes lardarius*, **L., feeding on Wood.**—*Ent. Mthly. Mag., London*, no. 700, September 1922, p. 209.

Dermestes lardarius, L., is recorded as boring in the woodwork of a large hide warehouse in Carlisle, The wood appears to be English spruce but very old and dry. When skins are removed, many larvae fall to the ground and seek shelter in any available cracks. When the food in these cracks, consisting of fragments of skin and hair, is exhausted, the larvae bore into the boards, from which they are apparently able to extract sufficient nourishment to complete their life-cycle. Some of the burrows were a foot or more long and harboured mature beetles as well as larvae.

SCHOENE (W. J.). **Thirteenth Report of the State Entomologist and Plant Pathologist, 1920–21.**—*Qtrly. Bull. Virginia State Crop Pest Commis., Blacksburg*, iii, no. 4, January 1922, 30 pp., 4 figs. [Received 25th September 1922.]

The work in connection with the control of *Cydia* (*Laspeyresia*) *pomonella*, L., shows that the importance of the feeding period in late summer has been greatly underestimated in the preparation of spray recommendations. Spray calendars based on observations for only one or two seasons cannot always be depended upon owing to variable weather conditions.

The investigations in connection with *C.* (*L.*) *molesta*, Busck, included an exhaustive study of the biology of this moth, already noticed from another source [*R.A.E.*, A, x, 560].

The conditions in the melon fields were particularly favourable for the development of *Epilachna borealis* (squash ladybird), which appears to be established wherever watermelons are grown in Virginia. Hand-picking the adults and the eggs is practically the only remedial measure resorted to by the growers. There are various objections raised against spraying, one of them being that pigs are turned into the fields after harvest, in which case poisons could not be applied. Other methods suggested are killing the adults in winter while they are hibernating in masses on the trees adjoining the melon fields, community crop rotation plans, the use of trap-crops in early summer and late autumn, the development of early maturing varieties of melons, and the prompt destruction of all vines and fruit in the melon fields immediately after the second cutting of melons. Community co-operation in applying these measures should bring the pest under control within two years.

Work in connection with the woolly aphis of apple [*Eriosoma lanigerum*, Hausm.] has been continued, and it is believed that this Aphid is primarily a pest of young trees, since the trees seem to withstand attacks after they have been planted in the orchard for several years.

A brief account is given of the results obtained with various sprays tested for their action on Aphid eggs ; in this connection nicotine and soap appears to be the only effective solution. The sprays were applied on the 11th February and 1st March.

Reppert (R. R.), Schoene (W. J.) & Underhill (G. W.). **Notes on Woolly Aphis Studies.**—*Qtrly. Bull. Virginia State Crop Pest Commis., Blacksburg*, iv, no. 1, April 1922, 8 pp., 2 figs., 1 chart. [Received 25th September 1922.]

The first autumn migrants of *Eriosoma lanigerum*, Hausm., appeared on 19th September in Virginia in 1918, the maximum numbers occurred 3rd and 4th October, and from 16th October to 11th November only occasional individuals were found. In this latitude, at least, the young Aphids were found upon the twigs throughout the winter. A prosperous aerial colony was experimentally produced from some of these individuals, showing that the species may continue on apple twigs for at least two years without the mediation of the forms from elms. The spring migrants produce autumn migrants the same year. At least 50 per cent. of the Aphids that move to the roots in the autumn do so by falling to the ground rather than by crawling down the trunk. In Virginia the aerial forms are greatly reduced by the activities of the larvae of Syrphid flies.

The winter is passed on the roots and branches of the apple tree but may also be passed in the egg stage on the bark of elm. After several generations on the elm, winged individuals appear in the early summer and fly to the apple, this migration occurring between 15th and 30th May. By 23rd May the young grafts and seedlings were generally infested. The young Aphids were forming small colonies, which were located at the axils of leaves, in the forks of the young shoots and along the main stem especially where there was a scar or wound. Some colonies were established at the surface of the ground,

but had not apparently reached the roots. By this date many winged individuals were to be seen on the apple foliage, but none on the elms in close proximity to the nursery, though there was evidence of heavy infestation on these early in the season. By 27th May the winged individuals had disappeared from the grafts and seedlings, and several colonies were found below the surface of the soil in wounds, leaf scars, etc. By 16th June the aerial colonies decreased; some of the Aphids were still migrating to the roots, but in smaller numbers than previously. Of 50 seedlings examined, 25 contained colonies on the roots, whereas only 12 of the grafts were found to be infested.

Timely applications of nicotine and soap destroy the newly established aerial colonies and greatly retard root infestation. In the experiments here described a spray containing 40 per cent. nicotine sulphate diluted 1 to 400 and resin fish-oil soap at the rate of 8 lb. to 50 U.S. gals. was applied with a three-gallon compressed air sprayer. On the 27th May the trees were sprayed thoroughly from one side, the treatment being repeated after 20 minutes from the other side of the rows. A second application was made on 9th June.

Owing to the injury caused to the roots, potassium cyanide and calcium cyanamide cannot be recommended for the destruction of the Aphids infesting this portion of the plants. Liquid creosote used at the rate of 1 part to 30 parts of water and applied to the trees at the rate of 1 U.S. quart per tree did not show appreciable injury to the roots but effectually destroyed the Aphids. There are many difficulties in treating the roots with liquid insecticides, but further trials with creosote should be undertaken.

RUTGERS (A. A. L.). **Verslag [Report] van den Directeur 1 Juli 1921–30 Juni 1922.**—*Meded. Algem. Proefst. A.V.R.O.S., Medan*, Algem. Ser., no 14, 1922, 27 pp.

In the entomological section of this report Dr. C. Heusser records that most of the *Hevea* seed-beds were infested by mites. Oil palms suffered from an increased attack by *Oryctes* [*rhinoceros*, L.] and *Rhynchophorus* [*ferrugineus*, Oliv.]. *Phytorus dilatatus*, Jac., did considerable injury to tea in some localities. Injury to tea by *Helopeltis* was successfully kept down by systematic collection. The red coffee borer, *Zeuzera coffeae*, Nietn., occurred on one estate. As regards the coffee berry borer [*Stephanoderes hampei*, Ferr.], estates that adopted such radical measures as "rampassen" [*R.A.E.*, A, x, 506] obtained excellent results, the percentage of infested red berries falling from 40–90 per cent. to 0·5–3 per cent. An experimental plot of *Hibiscus cannabinus* was markedly injured by a beetle, *Agrilus acutus*, Thunb.

ZETEK (J.). **La Enfermedad "Circulo rojo" de las Palmas de Coco.** [The Red Ring Disease of Coconut Palms.]—*Rev. La Salle, Panama*, vi, April 1922, pp. 463–466, 1 fig. [Received 25th September 1922.]

The red ring disease of coconuts is widespread throughout the Republic of Panama. According to Nowell it is due to a Nematode, *Aphelenchus cocophilus*, Cobb [*R.A.E.*, A, viii, 411]. It is probable that this pest is introduced into coconut plantations by means of infested nuts. Its increase is also favoured by the fact that felled palms are allowed to lie and become a focus of infestation. The Nematodes are also carried from one palm to another by various

insects, and are themselves able to pass from the roots of one tree to those of another. Infested palms should be burned, and care must be taken not to cut or otherwise wound healthy trees.

ZETEK (J.). **El Uso del Bisulfuro de Carbono contra ciertos Insectos.** [The Use of Carbon Bisulphide against certain Insects.]—*Rev. La Salle, Panama*, June 1922, pp. 494–498. [Received 25th September 1922.]

This article describes carbon bisulphide, its action, and the methods employed in fumigating insect pests infesting the soil, buildings and stored products.

RAVAZ (L.). **La Fumagine.** [Sooty Fungus].—*Progrès Agric. et Vitic., Montpellier*, lxxviii, no. 39, 24th September 1922, pp. 295–299.

The relation between *Pseudococcus* (*Dactylopius*) *vitis* and the occurrence of sooty fungus on vines is discussed. As the presence of the scale is essential to the development of the fungus, remedial measures should aim at destroying the insect. The measures recommended are the application of hot water, a mixture consisting of 15 lb. stone lime, 8 lb. tar or heavy oil, and 200 gals. water, or 2–3 parts soft soap, 3 parts petroleum, and 100 parts water. The last emulsion may be applied even to the leaves and fruit, as it does not injure the plant in any way or spoil the flavour of the grapes.

HUTSON (J. C.). **The Rhinoceros or Black Beetle of Coconuts** (*Oryctes rhinoceros*).—*Trop. Agric., Peradeniya*, lix, no. 2, August 1922, pp. 106–109, 1 plate.

A general account is given of the life-history and habits of *Oryctes rhinoceros* [*R.A.E.*, A, vi, 259]. The beetle has occurred in Ceylon for many years without attracting very much attention, but as the coconut crop has now become one of the main industries of the Island, it is essential that measures should be taken to deal with it. That advocated is the careful extraction of adults, the wound being then plugged with coconut fibre soaked in tar, or with a mixture of sand and tar, and the hole stopped with clay. In this way the wounds are prevented from decaying or attracting the red weevil [*Rhynchophorus ferrugineus*]. Measures against the grubs have been previously noticed [*R.A.E.*, A, ix, 567, etc.]. All palm stems that are to be used for building purposes, fence posts, temporary bridges, etc., must be split up within three months after cutting. Whole logs can only be used for posts, etc., if the ends are tarred thoroughly or protected from rotting. The fungus, *Metarrhizium anisopliae*, and the predacious grubs of another beetle, help to reduce the numbers of *O. rhinoceros*.

DE LORGUES (J.). **Contre les Parasites des Arbres Fruitiers.**—*Jl. Agric. Prat., Paris*, xxxvii, no. 24, 17th June 1922, pp. 491–492.

It is pointed out that in the use of oleoresins as insecticides the application of a dose of the poison insufficient to cause death will yet diminish immunity in the insect, making a second application of an even smaller dose fatal. This was particularly noticeable in a case of dusting against the larvae of vine-moths. The effect of such doses is not easily recognised in species that at once feign death and fall to the ground when disturbed. When they die of asphyxiation or poisoning, the fall is generally delayed and irregular.

ZSCHOKKE (T.). **Ueber das Steinigwerden der Birnen und über Missbildungen an Obstfrüchten. Mit biologischen Notizen und Abbildungen über Capsiden, welche als Schädlinge an den Obstbäumen beobachtet und gesammelt wurden.** [The Hardness of Pears and Deformations in Orchard Fruit. With Biological Notes and Illustrations of Capsids observed and collected when injuring Fruit Trees.]—*Landw. Jahrb. d. Schweiz, Berne*, xxxvi, no. 4, 1922, pp. 575–593, 15 figs.

Though woody and misshapen pears occur more often on old trees than on young ones, they are also due in some extent to Capsid bugs, a fact that the author has confirmed by a series of experiments.

Up to now most of these bugs have been regarded as beneficial destroyers of Aphids and caterpillars. A list of 18 Capsids found on fruit-trees is given, and of these the following can be definitely classed as injurious: *Atractotomus mali*, Mey., *Calocoris biclavatus*, H. Sch., *Lygus pabulinus*, L., *Orthotylus marginalis*, Reut., and *Pilophorus clavatus*, L. Two generations occur in a year, and moults take place every 8–10 days according to the temperature, so that 40–50 days are necessary for the five moults. Late-developed individuals of the first generation may occur with early larvae and adults of the second. The larvae and adults of the second generation cause very little injury as compared with those of the first, the development of which occurs from April to June, when the shoots, blossoms and fruit are being formed. Another reason for the greater early injury may be a lack of sufficient Aphids and caterpillars at that time, when the rapidly developing bugs need much food.

The failure to trace injury to these bugs is due to the difficulty in detecting them, a fact that prevents the application of measures for shielding the fruit or for directly combating the pests. Suitable measures must be based on the knowledge that they injure the developing fruit in May and June. While, however, the bugs are easily killed by a contact poison such as a 2½ per cent. solution of soap, the difficulty of reaching these elusive insects presents an almost hopeless obstacle in practice [*cf. R.A.E.*, A, iv, 107].

RIOFRÍO (B. F.). **Observaciones sobre un Gusano parásito de muchas Plantas cultivadas.**—*Anales Inst. Gen. y Técnico de Valencia*, Trab. Lab. Hist. Nat. no. 12, 1922, 11 pp.

The presence of *Heterodera radicicola* has recently been discovered in Spain in roots of tomato (*Lycopersicum esculentum*) in Valencia, and, almost simultaneously, in *Solanum nigrum* in Barcelona. In view of the number of plants attacked by this Nematode in other countries, it is probably of widespread occurrence in Spain.

GIMINGHAM (C. T.). **Notes on some Parasites of Beetles.**—*Ent. Mthly. Mag., London*, no. 701, October 1922, pp. 226–228.

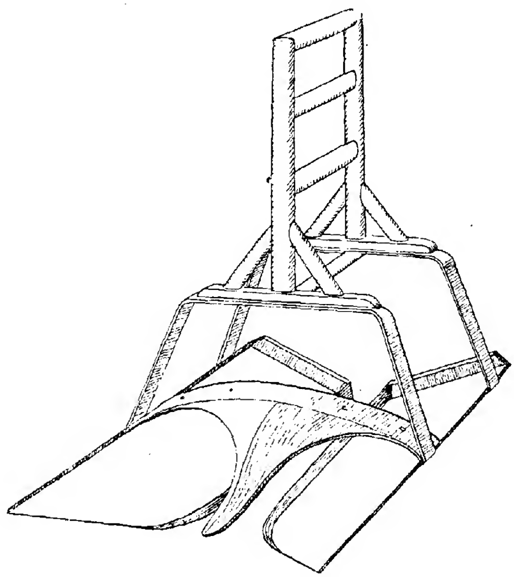
During 1921 a small area of field beans in Warwickshire was unusually heavily infested with *Bruchus rufimanus*. The Bruchids were severely parasitised by a Braconid, *Sigalphus luteipes*, Thoms., the maximum emergence of which occurred from 24th July to 7th August. Only one parasite was found in each larval host. On the whole, the infested beans in which the Bruchids were not parasitised were smaller and more shrunken than the others, but the plants grown the following year from infested beans appeared to be no less vigorous than those grown from sound seed.

Le Doryphora de la Pomme de Terre [*Leptinotarsa decemlineata*, Say].—*Jl. Agric. Prat., Paris*, xxxviii, no. 29, 22nd July 1922, pp. 76–79, 1 fig.

In view of the appearance of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in Gironde, and its probable occurrence in other parts of France, the importance of keeping watch for it is pointed out. Lesne's description of the appearance and habits of the insect is quoted, and the measures now being undertaken against it, as well as the legislation passed against its re-introduction and spread, are described [*R.A.E.*, A, x, 536].

Losch (H.). **Ueber die Bekämpfung der Käferplage in Weidenanlagen mit einem neuen Apparat.** [Combating Beetle Pests in Willow Plantations with a new Apparatus.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, pp. 453–455, 2 figs.

The apparatus for capturing beetles infesting willows illustrated below consists of two pieces of thin sheet metal, which face one another at such an angle that their upper edges are considerably further apart than the lower ones. Their edges are everywhere (except at the front)



turned up so as to contain the beetles that fall into them. These twin containers are fixed to a framework provided with a carrying handle with grips at various heights, so that the distance from the ground at which the apparatus is carried can be varied. A curved triangular beak of metal is attached to the outside of the upper edges of the receptacles in such a manner that the beak projects in front of and between them. In use the apparatus is carried at the side of the operator. As he walks along, the beak parts the willows, which are forced to bend beneath its sides and then pass along the channel between the containers. The beetles fall into the latter and are so confused by the continual beating of the willows that they do not try to escape. About one acre can be covered in three hours, without injury to the

VAYSSIÈRE (P.). **L'Anthonôme du Cotonnier** (*Anthonomus grandis*, **Boheman**).—*Agron. colon., Paris*, nos. 52 & 53, April & May 1922, pp. 97–102 & 150–155, 4 plates, 3 figs.

A general account is given of *Anthonomus grandis*, Boh. (cotton boll weevil), in view of the importance of keeping this pest out of the French Colonies, where cotton cultivation is being taken up.

ROZSYPAL (C.). **Velké množství smutníka jilkového na Moravě.** [Great Abundance of *Hypogymna morio*, L., in Moravia.]—*Ochrana Rostlin, Prague*, ii, no. 2, May 1922, pp. 17–18.

An unusual infestation by *Hypogymna morio*, L., is recorded from Moravia, about 500 larvae being found to every square yard. This exceptional abundance is thought to be due to an invasion of this moth from Hungary [*cf. R.A.E.*, A, ix, 448]. Although couch-grass appears to be the preferred food-plant, many other plants were also attacked. The remedial measures include rolling.

RAMBOUSEK (F.). **Katastrofální rozšíření larev kovaříků (drátovců).** [An Extensive Infestation by Wireworms.]—*Ochrana Rostlin, Prague*, ii, no. 2, May 1922, pp. 30–31.

Owing to weather conditions there has been an exceptional outbreak of wireworms in Czecho-Slovakia, the chief species concerned being *Agriotes ustulatus*. Most of the damage occurred in fields of winter grain, though spring grain, clover and turnips were also attacked. The measures recommended include heavy rolling and dusting the ground with slaked lime or kainit.

VIELWERTH (V.). **Zasychání klasů.** [Dry Ears.]—*Ochrana Rostlin, Prague*, ii, no. 3, August 1922, pp. 33–34.

The drying and shrivelling of the ears of corn, particularly wheat, though rye and oats were also attacked, is reported from many places in Czecho-Slovakia. It is attributed to various causes, one of the chief being *Limothrips* (*Thrips*) *cerealium*, *Stenothrips graminum* being also present. The damage was particularly severe owing to the weather conditions. The measures recommended are burning over small fields and deep ploughing.

KARNY (H. H.). **A remarkable new Gall-thrips from Australia.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvii, pt. 3, 15th September 1922, pp. 266–274, 6 figs.

The Phloeothripid, *Thaumatothrips froggatti*, gen. et sp. n., is described from New South Wales, where it causes galls on *Casuarina cambagei*. These are different from the galls usually caused by thrips, the whole development of the insect taking place in them.

HILL (G. F.). **A new Australian Termite.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvii, pt. 3, 15th September 1922, pp. 275–277, 4 figs.

Calotermes (*Calotermes*) *condonensis*, sp. n., is described from Western Australia.

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Hill (G. F.). **A new Species of *Mordellistena* (Coleoptera, Fam. Mordellidae) Parasitic on Termites.**—*Proc. Linn. Soc. N.S.W., Sydney,* xlvii, pt. 3, 15th September 1922, pp. 346–347, 2 figs.

Mordellistena erythroderes, sp. n., is described from North Queensland, where it was found in rotten logs infested with *Calotermes (Glyptotermes) nigrolabrum*, Hill. This species would be hardly likely to prove of any practical value unless it could be established in the colonies of some of the more destructive species of termites, and this seems improbable.

Duport (L.). **Rapport sur les Travaux poursuivis à la Station [Entomologique de Cho-Ganh] en juin et juillet 1922.**—*Sta. Ent. Cho-Ganh, Bull. Periodique, Hanoi,* no. 17, 1922, 4 pp.

The rearing of parasites of *Xylotrechus quadripes*, Chev. (coffee borer) has continued on the same lines as before [*R.A.E.*, A, x, 519] in spite of adverse weather conditions. The multiplication of the Braconid, *Doryctes strioliger*, Kieff., has been rather retarded by storms. The Bethylid, *Sclerodermus domesticus*, Kieff., is increasing much more regularly than last year, although the insects only appear in fine, warm weather. The rearing of this species is somewhat hampered by the activities of a small parasite that attacks both the larvae of the borer and those of the Bethylid. *S. domesticus* seems to be the most promising of all the parasites, as it is the hardiest species, is very active in reaching its host, and has a longer adult life than the others.

The Agricultural Appropriation Act, 1922-23.—*Expt. Sta. Record, Washington, D.C.,* xlvii, no. 1, July 1922, pp. 1–8.

The total allotment for entomological work under the annual acts making appropriations for the support of the U.S. Department of Agriculture has been increased from about £334,000 (at par) to about £356,000. In addition, £110,000 has been allotted for the campaign against the pink bollworm [*Platyedra gossypiella*, Saund.] and £5,000 for the control of the Mexican bean beetle [*Epilachna corrupta*, Muls.]. The chief increase is the £120,000 allowed for the prevention of the spread of the gipsy moth [*Porthetria dispar*, L.] and of the brown-tail moth [*Nygmia phaeorrhoea*, Don.] (an increase of £40,000), and that of £3,000 to be used against the camphor scale [*Pseudaonidia duplex*, Ckll.]. Other pests against which special allotments have been made include the date scale [*Parlatoria blanchardi*, Targ.], European corn borer [*Pyrausta nubilalis*, Hb.], grasshoppers and various pests of vegetable crops and stored products.

Ruth (W. A.). **An Explanation of recent Failures in San José Scale Control.**—*Illinois Agric. Expt. Sta., Urbana,* Circ. 252, March 1922, 4 pp. [Received 3rd October 1922.]

The control of the San José scale [*Aspidiotus perniciosus*, Comst.] by spraying in southern Illinois has proved unsatisfactory on a number of occasions. From observations it would seem that the great deviation in the amount of spray applied under commercial conditions from that used experimentally may account for this. To obtain successful results it is essential that the diluted spray should contain 15 lb. sulphur in 50 U.S. gals., with which the entire surface of the trees

must be heavily covered. The contrasting results obtained in northern Illinois, where weaker applications have been continually successful, may be explained by the different climatic conditions. The temperature in the south results in the development of a larger number of broods and consequently greater infestation, whereas in the north the low winter temperature often causes the death of many insects.

GIBSON (A.) & ROSS (W. A.). **Insects affecting Greenhouse Plants.**—*Canada Dept. Agric., Ottawa*, Bull. N.S. 7 (Ent. Bull. 21), 1922, 63 pp., 3 plates, 35 figs.

It is estimated that about six million square feet of space is used for growing plants under glass in Canada, the crops raised in this way for commercial purposes in 1920 being valued at about £600,000 (at par). This bulletin has been written to enable growers to recognise the various kinds of insect pests likely to be found on greenhouse plants, and to control the infestations as far as possible. A general account is given of insecticides suitable for greenhouse use and their application, the group of insects for which each is intended being enumerated. Special attention is given to hydrocyanic acid gas fumigation and the method of computing the space to be treated.

TOTHILL (J. D.). **The Natural Control of the Fall Webworm (*Hyphantria cunea*, Drury) in Canada, together with an account of its several Parasites.**—*Canada Dept. Agric., Ottawa*, Bull. N.S. 3 (Ent. Bull. 19), 1922, 107 pp., 6 plates, 99 figs.

The detailed account of *Hyphantria cunea*, Drury (fall webworm) in Canada here given shows that some of the outbreaks of this moth between 1912 and 1919 might have been greatly reduced in intensity or even prevented by the timely transfer of insect parasites from one part of the continent to another. The usefulness of the parasites is greatest when the host is only moderately abundant and a condition of stabilised control is possible. The maintenance of this equilibrium between host and parasite is most important, as should the host become scarce, the parasite will die out and thus enable the remaining host individuals to give rise to a more than usually severe infestation. Both in eastern Canada and in British Columbia some birds assist in maintaining this stability. The most important parasites may disappear from time to time over considerable geographical areas; it is therefore not sufficient merely to colonise parasites—their stability must also be maintained. Once a parasite has been eliminated from a locality, its return may be prevented for an indefinite number of years by natural barriers. The narrow strait between the mainland and Vancouver Island kept the webworm situation in the two localities distinct for three successive years. When the first flight of *H. cunea* reaches Vancouver Island, parasites should at once be introduced so that the required equilibrium may be maintained from the beginning.

The food supply is a very important factor in the distribution of *Hyphantria*. A large number of the moths are carried by the wind into foodless parts of the surrounding forest, and as only the alders exposed to the wind are found by the moths, large numbers of the trees are never attacked. The increased food supply (apple trees besides the original alders) would seem to account for the greater severity of the outbreak in the Annapolis valley as compared with

those in New Brunswick in 1912 and 1919. Individual outbreaks appear to be due to the landing of a flight of moths, infestations always appearing suddenly rather than rising gradually.

The life-history, habits and behaviour of the parasites concerned in the present study are described in great detail, and unless otherwise stated apply mainly to Fredericton. The Tachinid, *Compsilura concinnata*, Meig., has more than one generation a year in New Brunswick, though the exact number is not known. Under favourable conditions about six weeks are required for the completion of a generation. This fly is larviparous and deposits its young in or near the mid-intestine of the larval host. The carcass of the host is entirely consumed before decomposition sets in. *Lydella hyphantriae*, sp. n., deposits its larvae in the third to last stage larvae of the host in fine weather only. In some localities larviposition began about 13th in others not until 22nd August; it lasts about two or three weeks. The parasitic larvae were all found in the mid-intestine of the host, between the peritrophic membrane and the wall proper, this being apparently their normal feeding ground. *Ernestia ampelus*, Wlk., hibernates in the pupal stage, the adult flies emerging in the latter part of May or middle of June according to weather conditions. The maggots are deposited from 2–4 weeks later and are dependent for food on a host larva crossing their path; they may spend five days on the twig, after which about 26 are spent in the host as larvae. Pupation may last about 270 days; there is apparently only one generation a year, though under unusually favourable conditions a partial second generation may occur. There is also reason to suppose that the main generation is double-brooded, the early brood attacking July caterpillars such as *Hyphantria*. Pupation occurs in the ground.

Hymenopterous parasites include *Campoplex* (*Ameloctonus*) *pilosulus*, Prov., which lays its eggs in the caudal end of the second, third or fourth stage of the host larva. The larval stage lasts about three weeks, and the host is kept alive until the last possible moment; when death is about to ensue, the parasite immediately begins the destructive feeding stage. Pupation occurs within a cocoon in the host and lasts about nine days. It is possible that a spring or early summer generation occurs on some host other than *Hyphantria*, though nothing is known of the activities of this parasite before August. There is apparently only one generation a year of *C.* (*A.*) *validus*, Cress., though in the southern parts of the United States there are two, in which case it is probably a normal parasite of *Malacosoma americana*. It is also a minor parasite of *Hemerocampa leucostigma*. In its habits and behaviour it is very similar to *C. pilosulus*. *Apanteles hyphantriae*, Riley, has so far only been reared from *Hyphantria*. The eggs are usually deposited during the first two weeks in August, when the larvae of *Hyphantria* are in the second and third stage. The eggs hatch within about seven days, and the larval stage lasts about two weeks. The pupal stage lasts from 5–6 days, and hibernation occurs in the adult stage. Nothing is known of the activities of this parasite in spring. In Washington, D.C., this species has two generations a year, and there may also be two in New Brunswick, in which case the first must attack some host other than *Hyphantria*. *Therion morio*, F., is a common parasite of *H. cunea* and has also been recorded from *Vanessa cardui*, *Iphidicles ajax* and *Zerene centenaria*. The eggs are inserted at the caudal end of the larval host. They probably hatch in from 10 to 14 days. A very long

time is spent in the larval stage, the parasite still being in an anomalous stage, called by the author the feeding embryo, when the host is in the pupal stage.

A very large number of parasites succumb annually as a result of the limited food supply, and for the same reason one caterpillar of *Hyphantria* may be attacked by several parasites, either of the same or different species. As many as 22 parasitic larvae, belonging to four species, have been found in one host. As the host larva is only sufficient to maintain one parasite, whichever of these reaches the destructive feeding stage first is likely to become the sole survivor; *Therion* is the most handicapped, as it is the last to reach this stage. The struggle may take place between larvae of the same species, and should several individuals reach this stage within a few hours of one another none of them will be able to survive. Except under unusual circumstances this interparasitic struggle does not appear seriously to hinder the work of the parasites, the natural sequence of them occurring in average years being sufficient to reduce it to unimportance. The two great gaps in this sequence are the absence of parasites of the egg and adult, which is probably due to the brevity of these stages.

In New Brunswick, Nova Scotia and British Columbia the absence of hyperparasites of *Hyphantria* is also very marked. This may be explained by the fact that in these areas the primary parasites, like the host, have only one generation a year, and the hyperparasites, having at least two and sometimes four or five generations, would have to support their spring and midsummer generations on parasites of hosts other than *Hyphantria*. This difficulty does not arise in the transition zone, where *Hyphantria* has two generations.

An account is also given of some of the defensive measures of *Hyphantria* against its enemies, such as the armature of the larva, the community web, phagocytosis and the habit of flying away from parasites.

LAFFERTY (H. A.), RHYNEHART (J. G.) & PETHYBRIDGE (G. H.). **Investigations on Flax Diseases. (Third Report.)**—*Jl. Dept. Agric. & Tech. Instr., Ireland, Dublin*, xxii, no. 2, August 1922, pp. 103–120, 11 figs.

The investigations into flax diseases previously reported upon [*R.A.E.*, A, ix, 446] have been continued. Experiments in the transmission of Browning disease (caused by the fungus *Polyspora lini*), showed that insects such as *Longitarsus parvulus*, Payk. (flax flea-beetle) may, under natural conditions, act as mechanical carriers in its early stages by spreading the fungus from below to the top of the plant, whence it is rapidly disseminated to adjoining plants by direct contact or through other agencies.

A good deal of further data concerning *L. parvulus* [*R.A.E.*, A, x, 339] has been obtained. Adults emerged in mid-July, one month earlier than in the previous year. As the greatest damage is done by those beetles that appear during July and August, and, after hibernation, attack young flax during the following spring, it is obvious that the seriousness of attack in any given season is dependent on the weather conditions of two seasons. The maximum damage may be expected when previous conditions have ensured the survival of a large number of beetles, and present conditions are unfavourable to the rapid growth of the flax brairds. Many experiments in remedial measures are recorded, but the majority gave no successful results.

The most promising were with various Bordeaux mixtures, which seemed to have a repellent effect on the beetles; the addition of lead arsenate also gave good results. A drawback to the use of liquid sprays is the lack of spreading and adhesive properties in the flax plant, and a suitable spreading agent remains to be discovered.

The large green Capsid, *Calocoris bipunctatus*, F., was very prevalent in 1921; it generally confines its attention to those parts of the field near the hedges, and often near the one most sheltered from the wind. Just before the flowering period the main stem of the flax plant is pierced at, or just behind, the growing-point; growth of the terminal bud is arrested and lateral buds throw out branches. The adults were observed in June in 1921; gravid females were noticed in mid-July, but towards the end of that month they mostly left the flax plants and settled on flowers of the corn marigold (*Chrysanthemum segetum*) and other weeds. Eggs were laid during August on corn marigold, ragwort, thistle, charlock, redshank, etc., but never on flax. The eggs hatch in the following April or May. The obvious remedy is to keep the flax fields and also fences and hedges free from weeds, particularly ragwort, and to collect and burn any that remain after the flax is pulled.

Lygus pratensis, L. (tarnished plant bug) does exactly the same damage to flax as the foregoing species; its life-history is similar, and remedial measures would be the same.

The caterpillars of the moth, *Phytometra* (*Plusia*) *gamma*, L., were numerous in early August and consumed a good deal of foliage of the flax plants, but they are not regarded as a serious pest as the plants are usually pulled before they have had time to do much damage.

CHEESMAN (L. E.). *Rhyssa persuasoria:* **Its Oviposition and Larval Habits.**—*Proc. S. London Ent. & Nat. Hist. Soc. 1921-22, London*, 1922, pp. 1–2.

Observations are described on the oviposition of *Rhyssa persuasoria*, which, by means of its very long ovipositor, bores into larch logs infested with *Sirex gigas*. The resulting larvae are predacious on those of *S. gigas*. After twelve months the logs were split open and examined. Only a few larvae of *S. gigas* remained in isolated burrows, while the logs were intersected by tunnels containing larvae of *R. persuasoria*.

JACKSON (D. J.). **Notes on Aphides from Sutherland. Part II.**—*Scottish Naturalist, Edinburgh*, no. 125–126, May–June 1922, pp. 85–92, 3 figs.

In this continuation of a paper previously noticed [*R.A.E.*, A, x, 351] the species recorded are :—*Brachycolus holci*, Hardy, on *Holcus lanatus*, causing short and stunted terminal shoots; *Aphis sambucaria*, Pass., on leaves of elder (*Sambucus nigra*), some of the alate females being attacked by a fungus belonging to the Entomophthoraceae; *A. urticaria*, Kalt., on nettles, the oviparous female being described; *Rhopalosiphum eriophori*, Wlk., on *Eriophorum angustifolium* (originally described from the apterous oviparous female and all stages being now described), attacked by a fungus, probably *Entomophthora aphidis*; *Anuraphis centauriella*, Theo., on knapweed (*Centaurea nigra*) amongst colonies of *Macrosiphum jaceae*, L.; *M. urticae*, Schr., on leaves of nettle, the alate male being described; *Toxoptera graminum*, Rond., on grasses; and *Myzus persicae*, Sulz. (*dianthi*, Schr.), on clover.

CALDERON (S.). **Silk-producing Insects of the Republic of San Salvador: *Eutachyptera psidii* and *Rothschildia jorullo*.**—*Rev. Agric. Tropical, San Salvador*, i, no. 1, January 1921, pp. 9–14, 4 figs. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 12, December 1921, pp. 1602–1603.) [Received 3rd October 1922.]

Among the silk-producing moths in San Salvador, *Eutachyptera psidii*, Sallé, found in oak woods, and *Rothschildia jorullo*, Westw., are capable of attaining a certain economic importance. In his experiments the author was unable to breed the latter because all the pupae were parasitised by a Tachinid, *Belvosia analis*, Macq.

BROCQ ROUSSEU (—). **The Separation of Sound Beans from those attacked by Bean Weevil** (*Acanthoscelides obtectus*).—*Bull. Soc. sci. d'Hyg. alimentaire et d'Alimentation rationelle de l'Homme, Paris*, ix, no. 5, 1921, pp. 332–335. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 12, December 1921, pp. 1645–1646.) [Received 3rd October 1922.]

The proportion of beans infested with *Bruchus* (*Acanthoscelides*) *obtectus*, Say, varied from 1 to 67 per cent. in samples examined. If the beans are placed in liquids of densities appropriate to the kind of bean under examination, the sound ones will sink and the others float. For a lot of white beans, of which 67 per cent. were infested, the author had to use a 50 per cent. solution of sodium nitrate with a density of 1·418. The sound beans that have sunk to the bottom can be washed immediately and their value is unaffected. Other beans of lower specific gravity are more easy to treat. For red beans a 25 per cent. solution of sea salt (sp. gr. 1·26) proved suitable.

A Forest Insectarium in Spain.—*Rev. de Montes, Madrid*, xlv, no. 1065, 1st November 1921, pp. 466–467. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 12, December 1921, p. 1651.) [Received 3rd October 1922.]

The Spanish Forest Fauna Commission has recently opened a forest insectarium for the study of parasites that destroy insects injurious to forest trees.

DE FREITAS MACHADO (L.). **Insects injurious to the Cotton Plant, in Brazil.**—*Lavoura e Criação, Rio de Janeiro*, vi, no. 8, August 1921, p. 189. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 12, December 1921, p. 1652.) [Received 3rd October 1922.]

The following are the insect pests of cotton hitherto recorded in Brazil:—Lepidoptera: *Platyedra gossypiella* (pink bollworm); *Alabama argillacea*, *Utetheisa ornatrix* and *U. bella*, attacking the leaves; and *Ephestia cautella*, destroying the seeds. Coleoptera: *Colaspis* sp., injuring the leaves; *Spermophagus hoffmannseggi*, destroying the seeds; and *Gasterocercodes gossypii*, attacking the plant at the region of the collar. Rhynchota: *Saissetia depressa* and *Hemichionaspis minor*, injuring the stem; *Aphis gossypii*, injuring the leaves; and *Dysdercus ruficollis*, *Plociomera* (?) sp., *Oncopeltus* sp., and *Gargaphia* sp., attacking the bolls.

BRÈTHES (J.). *Gyropsylla ilicola*, **n. gen. and n. sp., attacking Maté** (*Ilex paraguariensis*) **in the Republic of Argentina.**—*Universidad Nac. de La Plata, Rev. de la Facultad de Agronomia, La Plata*, xiv, no. 2, 1921, pp. 82–89, 6 figs. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 12, December 1921, p. 1654.) [Received 3rd October 1922.]

A description is given of *Gyropsylla ilicola*, gen. et sp. n., infesting *Ilex paraguariensis*. This Psyllid causes the leaves to wither and thus spoils the crop. The edges of the leaf curl up and form a kind of bag harbouring a colony of the insects. Several dried pouches may be made on the same leaf, and they protect the larvae against insecticides. It is also of little use to combat the adults, as they occur on other plants besides *I. paraguariensis*. The best time for control is when the larvae are newly hatched.

Spraying with a two per cent. solution of tobacco extract is suggested for trial, the best time being thought to be in October, when the new shoots are 5–8 cm. long. Should rain fall after the application, it must be repeated.

ECKSTEIN (F.). **Ueber die Lebensweise von** *Thanasimus* (*Clerus*) *formicarius*, **Latr.**—*Forstw. Zentralbl.*, xliii, 1921, pp. 57–62. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., lvii, no. 4–10, 18th September 1922, pp. 190–191.)

Thanasimus (*Clerus*) *formicarius*, Latr., which preys upon bark-beetles, oviposits from the end of March to May during the flight-period of the hosts. Its larva pupates in September and October, and the adult emerges in the following spring. This beetle is comparatively unimportant as a check on bark-beetles, although large numbers are destroyed. The broods of *T. formicarius*, as well as those of the bark-beetles, are killed by the early removal of the bark of trap-logs.

CIFERRI (R.). **Insetti nocivi alla vite.** [Insects injurious to the Vine.] —*Riv. Agric., Parma*, xxvii, nos. 39, 40, 42 & 43, 29th September, 6th, 20th & 27th October 1922, pp. 586–587, 600–602, 626–627, 640–642.

In this series of articles the various insect pests of the grape-vine in Italy and the measures advisable against them are described in a simple manner. The species dealt with as of more or less importance include :—Orthoptera : *Dociostaurus maroccanus*, Thunb. Rhynchota : *Pulvinaria vitis*, L., and *Pseudococcus* (*Dactylopius*) *vitis*, Nied., *Phylloxera* being reserved for a special article. Coleoptera : *Melolontha melolontha*, L. (*vulgaris*, F.), *Anomala vitis*, F., *Sinoxylon sexdentatum*, Oliv., *S. bispinosum*, Oliv., *Rhynchites betulae*, F., *Otiorrhynchus sulcatus*, F., *Haltica ampelophaga*, Guér., and *Bromius obscurus*, L. Lepidoptera : *Pergesa* (*Chaerocampa*) *elpenor*, L., *Procris* (*Ino*) *ampelophaga*, Hb., *Euxoa* (*Agrotis*) *tritici*, L., var. *aquilina*, Hb., *A. pronuba*, L., *Sparganothis pilleriana*, Schiff., *Clysia* (*Conchylis*) *ambiguella*, Hb., and *Polychrosis* (*Eudemis*) *botrana*, Schiff.

CIMATTI (V.). **La mosca delle olive.** [The Olive Fly.]—*Riv. Agric., Parma*, xxvii, no. 43, 27th October 1922, pp. 645–647.

An account of the life-history of the olive fly [*Dacus oleae*] and the injury it causes is given, together with instructions for preparing the poison-baits now largely used against this pest [*R.A.E.*, A, ix, 586].

GOWDEY (C. C.). **The Banana Borer** (*Cosmopolites sordidus*, **Germar**).—*Jamaica Dept. Agric., Kingston*, Ent. Circ. 8, 1922, 8 pp., 2 plates.

Cosmopolites sordidus, Germ. (banana borer) has probably been present in Jamaica for some years, but has lately attained the status of a major pest on account of the greatly increased cultivation of the banana, and because many neglected banana plots occur as the result of successive hurricanes or the abandonment of this crop for sugar-cane. A general account of the pest is given, and the methods of prevention and control advocated against it are outlined.

SIMMONDS (H. W.). **Entomological Notes from Fiji, Fortuna, Wallis, Vanualevu and Taveuni Islands.**—*Agric. Circ. Fiji Dept. Agric., Suva*, iii, no. 2, April–June 1922, pp. 19–25.

Promecotheca reichei, Baly (leaf-mining beetle of coconuts) is well distributed in Fortuna and Wallis Islands, but is not a severe pest, though in parts of Fiji it sometimes does considerable damage. The eggs are laid on the lower surface of the leaf, and the larva mines between the two surfaces. The numbers are largely checked by parasites, a species of *Elasmus* attacking the larvae and a Chalcid, *Chaetostricha* sp., destroying the eggs. A species of *Agonoxena*, probably *A. argaula*, Meyr., was found eating the leaves in company with *P. reichei*, and was parasitised by an unidentified Chalcid. *Aspidiotus destructor*, Sign. (coconut scale) was present in several of the smaller islands.

Cosmopolites sordidus, Germ. (banana borer) was present in Wallis, but not in Fortuna. It is suggested that if a nursery were established in one of the uninfested localities in Fiji, clean suckers originating from it could be planted in land on which no bananas have been grown for twelve months, and on such an estate it should be possible to reduce damage to a minimum.

Tobacco in Fortuna was found to be infested by a Tineid moth, the larvae of which bore into the stem and cause abnormal swellings. The natives open these to remove the larvae, after which the plant starts into renewed growth. The insect answers to the description of *Phthorimaea* (*Gnorimoschema*) *heliopa*, Low., which is an important pest of tobacco in India, and fumigation against it is advocated in order to save the tobacco crop of Fiji.

In Waiwai, the Phasmid, *Lopaphus cocophagus*, Newp., was doing much damage, and *Dacus passiflorae*, Coq. (fruit fly) was noticed; both there and in Taveuni, the moth, *Othreis fullonica*, L., destroyed a large part of the orange crop. In Soqulu two apparent cases of bud-rot were examined; in one case a bad infestation of the moth, *Trachycentra chlorogramma*, Meyr., was found, and in the other (not a typical case) were many Nematodes. The Curcubitaceous plant known as the New Guinea bean was defoliated by the larvae of the Pyralid, *Margaronia indica*, Saund., and by the beetle, *Aulacophora fabricii*.

At Ura it was noticed that the big spathe coconut moth, *Acritocera negligens*, Butl., and the smaller young nut moth, *Tirathaba trichogramma*, Meyr., were attracted to lights in houses. This may prove an important discovery as a remedial measure.

Cacao in Fiji is much damaged by the Japanese rose beetle, *Adoretus tenuimaculatus*, Waterh., which also attacks *Acalypha* sp.; if the latter tree is preferred, it may be used as a trap.

Bulbuls were noticed devouring many hornets (*Polistes hebraeus*, F.), and these birds are evidently an important factor in reducing their numbers.

Coconut Scale.—*Agric. Circ. Fiji Dept. Agric., Suva*, iii, no. 2, April-June 1922, pp. 25–27.

In accordance with the terms of the Diseases of Plants Ordinance of 1913, the islands on which the coconut scale (*Aspidiotus*) occurs are enumerated, and the shipping restrictions made in order to prevent the spread of the pest are clearly defined.

Woglum (R. S.) & Borden (A. D.). **Control of the Citrophilus Mealybug.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 1040, 12th April 1922, 20 pp., 13 figs. [Received 5th October 1922.]

The bulk of this information has been previously noticed [*R.A.E.*, A, viii, 316]. Special attention is drawn to the necessity for eradicating the Argentine ant, *Iridomyrmex humilis*, Mayr, in all orchards infested by the citrophilus mealybug, *Pseudococcus gahani*, Green, for experience has shown that it is only when protected by the ant that the mealybug is enabled to become seriously destructive. The best remedy for the ant is arsenical poison syrup in small containers, one to each tree, distributed in the autumn or spring.

Back (E. A.) & Cotton (R. T.). **Stored Grain Pests.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1260, 1922, 47 pp., 64 figs. [Received 5th October 1922.]

A general account is given of the insects damaging stored grain in the United States, of which there are four principal species, *Calandra granaria*, L., *C. oryzae*, L., *Rhizopertha dominica*, F., and *Sitotroga cerealella*, Ol. The damage done by over 30 species is described, and the usual remedies are advocated.

Service and Regulatory Announcements, July–December 1921.—*U.S. Dept. Agric., Washington, D.C.*, Fed. Hortic. Bd., no. 71, 12th April 1922, pp. 95–178. [Received 5th October 1922.]

The pink bollworm [*Platyedra gossypiella*, Saund.] law of 1921, enacted at the special session of the Texas Legislature in July and August and approved by the governor 1st September 1921, corrects many defects in previous legislation and provides for co-operation with the United States Department of Agriculture and for compensation to planters in non-cotton zones.

The Federal Quarantine of Texas and Louisiana on account of the pink bollworm (no. 46) was revised to cover new infestations in Western Texas, New Mexico and Shreveport, Louisiana, and became effective on 10th September 1921. The quarantine restrictions in these States are limited to the areas actually invaded; and according to the amendment of regulation no. 3 of this quarantine, which became effective 1st November 1921, the island of Galveston was excluded from the areas in Texas designated as infested. These measures, issued as Quarantine no. 52 and Amendment no. 1, are given verbatim.

Late in 1921 two new points of infestation were discovered in the most important cotton section of Texas, their origin being traced to seed shipped from Carlsbad, New Mexico. Emergency quarantines were immediately placed about these districts. In view of the possibility of a wide new infestation a cotton-state pink bollworm conference was held 2nd December, at which the continuance of efforts, both State and Federal, for the extermination of the pest in Texas and other southern states was recommended and unqualified assurances of support were given. The policy of maintenance of non-cotton and regulated zones was endorsed. The enforcement of these zones was confined to the eastern districts, because of the close proximity of the western districts to Mexico and the consequent impossibility of maintaining freedom from the pest until adequate co-operation with Mexico should have been secured. In this connection the isolation of these districts from the main cotton belt has also been taken into consideration. The plans for the control work in 1922 are outlined. As far as is known, *P. gossypiella* has been completely exterminated from Louisiana, but precautionary control measures are being continued, though with the exception of the district about Shreveport all non-cotton zones are being discontinued for 1922, and the regulated areas are being released, only field inspections being continued in them.

The Quarantine Order no. 3 of the State of New Mexico for the prevention of the introduction and dissemination of the pink bollworm is being enforced, and the Federal Quarantine no. 52 has been recognised and made part of the New Mexico regulations.

The present distribution of *P. gossypiella* in the West Indies is recorded. As a result of the extent of infestation in Porto Rico and its occurrence in Santo Domingo, a general campaign of eradication is considered inadvisable ; complete eradication from these larger islands, in view of the cultural conditions and the abundance of wild cotton there, would seem impossible, and they would be a constant source of reinfestation for the smaller ones. The infestation in the West Indies is considered to be the result of the importation of Egyptian cotton seed in 1911-12 into the Island of St. Croix. By the existing quarantine the United States are protected from the movement of cotton, cotton seed, etc., from the West Indies.

The foreign quarantine on account of the European corn borer [*Pyrausta nubilalis*, Hb.] (no. 41) has been revised to include the restriction of the importation from Canada of various products known to be possible means of spreading the pest in addition to maize. Following the conference held at Sandusky [*R.A.E.*, A, x, 138], Domestic Quarantine no. 43 [*R.A.E.*, A, viii, 511] has been revised to include the new areas of invasion [*R.A.E.*, A, x, 217] and the regulations have been somewhat modified.

By the amendment to the regulations of gipsy moth [*Porthetria dispar*, L.] quarantine (no. 45) ten towns in New Hampshire, Massachusetts and Rhode Island have been transferred from the category of lightly infested to that of generally infested areas.

As a result of the increasing spread of the Japanese beetle [*Popillia japonica*, Newm.] it has been found necessary to extend the areas under restriction in Pennsylvania and New Jersey, and a corresponding revision of Quarantine no. 48 has been made, to become effective on and after 1st January 1922.

The area invaded by the Mexican bean beetle [*Epilachna corrupta*, Muls.] in Alabama is much greater than had been previously determined; it is also established in Georgia, Tennessee, Kentucky and South Carolina, indicating a fairly general dissemination throughout the South and making extermination or even effective quarantine control impossible. As a result, Quarantine no. 50 [*R.A.E.*, A, x, 275] was revoked 23rd July 1921.

A new quarantine has been declared against the States of New Hampshire and Massachusetts owing to the occurrence of the imported pest, *Stilpnotia salicis*, L. (satin moth). This quarantine, no. 53, became effective on and after 1st January 1922, and prohibits the movement of any species or variety of poplar (*Populus*) and willow (*Salix*) from any infested area within these States to or through any other district not known to be infested.

Owing to a sudden outbreak of *Pseudaonidia* (*Aonidia*) *duplex*, Ckll. (camphor scale) [*R.A.E.*, A, x, 73], a Federal quarantine in this connection has been discussed, but is not considered to be necessary at present, as the State quarantine established by the Department of Agriculture of Louisiana is being operated effectively in co-operation with the United States Department of Agriculture, and provides for the inspection, and if necessary fumigation, of any florist stock or similar material leaving New Orleans for outside points. In the estimate for 1922 about £3,000 (at par) is requested for investigation and control of this new pest.

The fumigation of shipments from France of fruit and rose seedlings infested with nests of the brown-tail moth [*Nygmia phaeorrhoea*, Don.] has proved to be an unreliable means of disinfection at temperatures below 50° F. and has therefore been discontinued, such shipments being refused entry.

By arrangement with the customs service and post office department the importation, through the mails, of special permit material under Regulation 14, Quarantine no. 37 [*R.A.E.*, A, x, 275] will hereafter be authorised on request, when warranted by the nature and amount of the proposed shipment.

A list of the current quarantine and other restrictive orders is given.

MOZNETTE (G. F.). **The Avocado. Its Insect Enemies and how to combat them.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1261, April 1922, 31 pp., 21 figs. [Received 5th October 1922.]

The information contained in this paper has largely been noticed from another source [*R.A.E.*, A, x, 69]. Further remedies suggested are: for *Anomala undulata*, Mels., 1½ lb. powdered lead arsenate to 50 U.S. gals. of water; for *Gracilaria perseae*, Busck (avocado leaf-roller), 1 lb. to 50 U.S. gals. water; and for *Acysta perseae*, Heid. (avocado lace-bug), 1 part of 40 per cent. nicotine sulphate solution to 900 parts water with 1–2 lb. fish-oil soap to each 50 U.S. gals. of the diluted spray.

KNIGHT (H. H.). **Studies of Insects affecting the Fruit of the Apple, with particular Reference to the Characteristics of the resulting Scars.**—*Cornell Univ. Agric. Expt. Sta., Ithaca, N.Y.*, Bull. 410. May 1922, pp. 447–498, 40 plates.

Extensive study has shown the possibility of determining the species of practically all the insects responsible for blemishes on apple fruit by an examination of the scars produced. Thirty species of insects

are dealt with in this paper, the type of injury done by each being discussed. New and little-known kinds of scar have been studied, particularly those caused by the apple redbugs, *Lygidea mendax* and *Heterocordylus malinus*. The scars due to other agencies are also briefly dealt with.

PLANK (H. K.). **The Blackhead Fireworm of Cranberry on the Pacific Coast.**

HEINRICH (C.). **Technical Description.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 1032, 25th April 1922, 46 pp., 3 plates, 15 figs. [Received 5th October 1922.]

In consequence of the severe damage to cranberry bogs on the Pacific Coast by *Rhopobota naevana*, Hb. (*vacciniana*, Pack.) (blackhead fireworm), which is the most injurious cranberry pest in that region, a thorough investigation was undertaken during 1918 and 1919, resulting in much additional information being gained regarding the life-history and remedial measures [*R.A.E.*, A, vi, 561; ix, 50; x, 55, etc.]. Flooding the bogs, which is one of the most successful measures practised in the Eastern States, is seldom resorted to on the Pacific Coast, and as it is most unusual for any of these bogs to be completely covered with water at any time, and the seasonal temperature is comparatively equable, while the number of parasites is small, every condition enables the pest to become very destructive. The larvae are, in fact, feeding on buds, foliage, blossom and fruit throughout the growing season. There are two full generations in a year and sometimes a partial third. Temperature, density of vines and drainage are the three most important factors in the hatching and development of this moth. The work of the larvae is shown by the burnt appearance of the vines, hence the name. The pupal stage is passed in a cocoon among old leaves or débris beneath the vines. The moths can be carried several hundred feet on the wind, and the eggs may be disseminated over a bog by means of leaves floating on the water or on leaves and cuttings used in planting.

Natural enemies include a fungus that destroys many pupae, especially on old and badly infested bogs. Spiders and Coccinellids devour many adults and larvae. Experiments on a large scale proved the most effective spray to be 40 per cent. nicotine sulphate, 1 part to 800 parts of water, with 2 lb. fish-oil soap per 50 U.S. gals., using about 300 U.S. gals. to the acre. With 1,000 parts of water instead of 800 the results were almost as good. Three applications of either should be made. Nicotine oleate, made by mixing $2\frac{1}{2}$ parts of a solution containing 40 per cent. free nicotine with $1\frac{3}{4}$ parts of commercial oleic acid (or red oil), using 1 part to 400 parts of water, applied three times at the rate of 300 to 400 U.S. gals. per acre, was also nearly as effective. Lead arsenate proved of little value. Fish-oil soap was a much better spreader than glue for cranberry foliage. Four applications of any of these sprays generally gave better results than three. The first should be made when the new growth is about $\frac{3}{4}$ in. high, the second when the blossoms are in the early "hook" stage, and the third when the vines are in full bloom. On heavily infested vines a fourth application should be made during the first two weeks of July. The spray can be made with Bordeaux or lime-sulphur solution instead of water, but in that case no soap should be added. A large eddy-chamber type of nozzle, throwing a medium fine mist, at a pressure of about 200 lb. at the tank is the best, and does not injure the blossoms. A spray gun should only be used on lightly infested bogs.

MIDDLETON (W.). **A Sawfly injurious to young Pines.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1259, January 1922, 11 pp., 10 figs. [Received 5th October 1922.]

The information here given on *Neodiprion lecontei*, Fitch, has been noticed from another source [*R.A.E.*, A, ix, 266].

VERESHTCHAGIN (B.). **Яблочная плодожорка** (*Cydia pomonella*, **L.**) **и мѣры ьорьбы съ нею.** [*C. pomonella* and its Control.]—**Фурника** [*Furnika*], *Kishinev*, no. 29-30, 30th July 1922, 3 pp.

An account is given of the life-history of *Cydia pomonella*, L., as occurring in Bessarabia. The results of observations carried out in 1920 and 1921 show that at least two, and under favourable conditions three, generations may occur annually. The larvae hibernate in the cocoon. A list is given of the varieties of apples arranged according to the amount of infestation, which appears to be least severe in the summer varieties. The remedial measures recommended include scraping the bark in early spring or late autumn, spraying with arsenicals, banding and enclosing the fruit in bags.

VERESHTCHAGIN (B.). **Борьба съ вредителями сельско-хозяйственныхъ растенiй. Вредители садоводства.** [Control of Agricultural Pests. Garden Pests.]—**Фурника** [*Furnika*], *Kishinev*, no. 27-28, 16th July 1922, pp. 13-14.

A brief account is given of the seasonal occurrence and usual remedial measures of some garden pests, including *Cydia pomonella*, *Psylla pyrisuga* and *Pieris brassicae*.

CODINA (A.). **Els enemics naturals dels insectes depredadors de les olives. I. Dos endòfegs de la mosca de la oliva** (*Dacus oleae*, **Rossi**) **nous per a Espanya. Un ectòfag de l'arna de la olivera** (*Prays oleaellus*, **F.**) **nou per a la provincia de Tarragona.** [The Natural Enemies of Insects attacking Olives. I. Two Internal Parasites of the Olive Fly new to Spain. An external Enemy of the Olive Moth new to the Province of Tarragona.]—*Butlleti Inst. Catalana Hist. Nat., Barcelona*, ii, no. 3, March 1922, pp. 59-73, 4 figs. [Received 7th October 1922.]

The Chalcids, *Eupelmus urozonus*, Dalm., and *Eulophus longulus*, Zett., are recorded from *Dacus oleae*, Rossi. *Ageniaspis fuscicollis praysincola*, Silv., infests the olive moth, *Prays oleellus*, F.

The measures recommended against *Dacus oleae* include the planting of olives among other trees. For utilising natural enemies two varieties of olives should be grown—1 per cent. of the plantation being a variety with early fruit and 99 per cent. a variety with late fruit. All the infested early fruits should be collected on two occasions and stored in boxes that permit the escape of the parasites.

LEHMANN (H.). **Die Baumweisslings-Kalamität und die Organisation zu ihrer Bekämpfung.** [The Outbreak of *Aporia crataegi* and the Organisation for combating it.]—*Flugschr. Deutsch. Ges. angew. Ent., Berlin*, no. 10, 1922, 31 pp., 11 figs., 1 map.

Though generally rare in Germany, *Aporia crataegi*, L., has caused severe losses to fruit growers in the Rhine Palatinate, where it has been numerous since 1917. Energetic action organised by the authorities checked the outbreak in the course of the winter of 1920-21, and

the work is here described in detail for use during any future outbreak of this butterfly. Hand-collection of all the winter nests of young larvae on the branches and their destruction was found to be the sole effective measure. If the pest appears in threatening numbers the work must be organised and supervised by the authorities. The campaign against a pest is half won if growers are really well informed regarding its habits and the measures needed against it.

In the general section of this paper it is pointed out that the Palatinate includes the warmest area in Germany, and that this results in its pre-eminence as an orchard and vineyard region and in an abundance of permanent pests, including *Clysia* (*Conchylis*) *ambiguella*, Hb., *Polychrosis botrana*, Schiff., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Malacosoma neustria*, L., *Lymantria dispar*, L., *Cheimatobia brumata*, L., *Cydia* (*Carpocapsa*) *pomonella*, L., Scolytid beetles, and *Agrilus sinuatus*, Oliv.

Faes (H.) & Staehelin (M.). **Les Traitements contre la Cochylis (Ver de la Vigne) en 1921.**—*Progrès agric. & vitic., Montpellier*, lxxviii, nos. 40 & 41, 1st & 8th October 1922, pp. 326–330 & 350–353, 2 graphs, 2 tables.

This information on measures against the vine moth [*Clysia ambiguella*, Hb.] has already been noticed elsewhere [*R.A.E.*, A, x, 320].

Dobrzhanski (F.). **К познанию женского полового аппарата божьих коровок (Coccinellidae).** [Contributions to the Knowledge of the Female Genital Apparatus of Coccinellids.]—Reprint from **Киевские Ученые Известия** [*Kiev Sci. Inform.*], *Kiev*, i, 1921, 3 pp. [Received 9th October 1922.]

The contents of this paper are indicated by its title.

Pettit (R. H.). **The Hessian Fly.**—*Michigan Agric. Expt. Sta., East Lansing*, Circ. 49, July 1922, 8 pp., 1 fig. [Received 9th October 1922.]

The life-history of and injury to wheat by the Hessian fly [*Mayetiola destructor*, Say] are briefly reviewed, and a calendar is given setting out the fly-free dates for sowing wheat in the different counties of Michigan.

Kotila (J. E.). **Spraying for Hopperburn.**—*Michigan Agric. Expt. Sta., East Lansing*, Circ. 48, July 1922, 4 pp., 2 figs.

A brief account is given of the importance of hopperburn of potatoes caused by the potato leaf-hopper [*Empoasca mali*, Le B.], the losses in Michigan amounting in many cases to 25 per cent. of the crop. Spraying with Bordeaux mixture [*R.A.E.*, A, x, 217] is recommended, and its preparation for large acreages is described.

Headlee (T. J.), Cook (M. T.) & Farley (A. J.). **Spray Calendars.**—*New Jersey Agric. Expt. Sta., New Brunswick*, Circs. 132–136, 1st February 1922, 4, 4, 4, 3, 3 pp., 3, 3, 2, 2, 1 figs. [Received 10th October 1922.]

These revised spray calendars suggest the best time and materials for spraying apples and quinces, peaches, pears, cherries and grapes, under New Jersey conditions.

SCHERMERHORN (L. G.) & NISSLEY (C. H.). **Control of the Cabbage Maggot.**—*New Jersey Agric. Expt. Sta., New Brunswick*, Circ. 138, February 1922, 4 pp., 2 figs. [Received 10th October 1922.]

Details are given of the tests carried out in New Jersey with a view to ascertaining the relative efficiency of commercial tar paper pads, tar and sand mixture, and mercury bichloride in the control of the cabbage maggot [*Phorbia brassicae*, Bch.] [*cf. R.A.E.*, A, IX, 372]. Mercury bichloride is recommended to commercial growers of early cabbage and cauliflowers in New Jersey, as it is the most easily applied, most economical and most efficient of these substances. During these experiments the first application was made when the plants were set out in the field, the second 8-10 days later.

SOUTH (F. W.). **Report of the Work of the Inspection Staff, October, November and December 1921.**—*Agric. Bull. F.M.S., Kuala Lumpur*, ix, no. 4, October–December 1921, pp. 284–289. [Received 4th October 1922.]

The outbreaks of *Brachartona catoxantha* on coconuts recorded in recent reports [*R.A.E.*, A, x, 33, 202] have been controlled by the action of insect and fungous parasites. Rice pests, besides stem-borers, included *Nymphula depunctalis*, damaging nursery plants, the leaf-eating caterpillars of *Parnara mathias* and *Melanitis ismene*, the former of which were largely controlled by a Hymenopterous parasite, and scattered groups of locusts, which in some localities did serious damage. The nurseries were swept with hand nets to catch the nymphs, while the adults were taken in large numbers when resting on tree stumps at night. Certain species of grasshoppers are always present on rice; the biology of these is being studied. *Gryllotalpa* sp. (mole cricket) was injurious in dry weather, but disappeared with the advent of rains. The rice bug, *Leptocorisa varicornis*, reappeared in some localities; lamps at night and poison bait by day were used against it, but the damage was not serious. Another bug, *Podops coarctata*, became a pest when the rice area was dry at the wrong time, but disappeared with moister weather. With a good water supply there is seldom danger from this pest.

BURKILL (I. H.). **Annual Report of the Director of Gardens for the Year 1921.**—*Straits Settlements* [*Singapore*], 6th July 1922, 5 pp.

The pests recorded during 1921 are *Protocerius colossus*, *Rhynchophorus ferrugineus* and *Oryctes rhinoceros* on various palms, the attacks of which were reduced by handpicking, a larva, probably of *Zeuzera* sp., in branches of wild *Litsea* and avocado pears, and *Papilio polytes* on *Citrus*.

BALLY (W.). **Indrukken van een Reis naar de Lampongs en naar West-Java.** [Impressions from a Journey to the Lampongs district and West Java.]—*Meded. Koffiebessenboeboek-Fonds, Soerabaya*, no. 3, August 1922, pp. 43–48.

In view of reports that infestation by the coffee-berry borer [*Stephanoderes hampei*] had decreased in West Java owing to fungus infection [*R.A.E.*, A, x, 507], it was thought advisable to test their accuracy and to ascertain what conditions favoured the fungus, and whether a natural decrease of the infestation resulted. The

conclusion reached is that attacks by this beetle fluctuate, and that a diminished injury in one year is no guarantee against severe injury the next year. There is nothing to warrant neglect of remedial measures, and a careful study of the parasitic fungus is desirable.

WURTH (T.). **Een Vuurwants** (*Dindymus rubiginosus*, **F.**) **die Jacht op de Bessenboeboek maakt.** [A "Fire Bug," *D. rubiginosus*, preying on the Coffee-berry Borer.]—*Meded. Koffiebessenboeboek-Fonds, Soerabaya*, no. 3, August 1922, pp. 49–52, 4 figs.

When in 1896 certain coffee plantations in Java were defoliated by caterpillars of *Oreta extensa*, predacious bugs contributed materially to checking the infestation. In February 1922 these bugs, identified as *Dindymus rubiginosus*, F., were seen drawing the coffee-berry borers [*Stephanoderes hampei*, Ferr.] out of their bore-holes and sucking them. In the forests *D. rubiginosus* preys on bark-beetles. Attention is drawn to the resemblance between *Dysdercus cingulatus*, F. (a pest of cotton and allied plants) and this beneficial species; the latter cannot, however, prove of any considerable use in checking the coffee-berry borer.

GANDRUP (J.). **Over Boeboek in Loewak-Koffie.** [The Coffee-berry Borer in Coffee Berries excreted by *Paradoxurus hermaphroditus*.] —*Meded. Koffiebessenboeboek-Fonds, Soerabaya*, no. 3, August 1922, pp. 53–54.

These investigations, made independently of those by Leefmanns [*R.A.E.*, A, x, 566], also prove that the coffee-berry borer can be spread by means of the droppings of *Paradoxurus hermaphroditus*.

FRIEDERICHS (K.). **Kleine Mededeelingen omtrent de Koffiebessenboeboek.** [Short Communications on the Coffee-berry Borer.]—*Meded. Koffiebessenboeboek-Fonds, Soerabaya*, no. 3, August 1922, pp. 55–61.

Coca fruits bored by the coffee-berry borer [*Stephanoderes hampei*] have been received, but experiments show that the beetle only uses these as a shelter and not for breeding in.

Corporaal has found that the male beetle never leaves the coffee berry inside which it emerged. It remains there after the departure of the females that emerged at the same time and have mated with it. The author points out that this does not always lead to in-breeding, as several females may bore into a given berry, and perhaps unfertilised females from one berry may mate in another. Collection of the blackened berries is a measure against both sexes; collection of unripe, bored berries and the artificial spread of the parasitic fungus affect the female only.

On an estate where *Coffea robusta* had been pruned down to the stem following berry-borer infestation, the new branches and the older wood as well were bored by the beetles, which occurred in large numbers. This abnormal boring was evidently due to the absence of berries. The new infestation probably originated in fallen coffee berries that had not been carefully cleared away.

DE HAAN (H. R. M.). **Proeven ter Bestrijding der Bessenboeboek volgens de Metode "van Davelaar" in het Ressort Malang.** [Experiments in combating the Coffee-berry Borer by the Method of van Davelaar in the Malang District.]—*Meded. Koffiebessen-boeboek-Fonds, Soerabaya,* no. 4, August 1922, pp. 63–75.

This paper contains detailed information about eight large-scale practical tests made from February to May 1922 with the van Davelaar method against the coffee-berry borer, *Stephanoderes hampei*, Ferr. [*R.A.E.*, A, x, 507]. The mixture used was made of six parts axle grease and one of petroleum, and this was applied in a thin coat. An excess of petroleum injures the plant, while a lack of it fails to kill the pest. The above proportion seemed suitable for the plant and for killing the adult beetle, but appeared too weak to destroy the larvae. The coating does, however, prevent new attacks. The adhesive quality of the mixture is of a temporary nature, and does not last more than two months in the dry season. About four applications seem necessary for complete results—the first during October–December; the second during January–February; the third during March–April; and the fourth in May. A fifth application may perhaps be needed in June. This means that 1,000 women workers will be needed for a plantation of 100,000 bushes. For the time being this method can only be useful when a given plantation must be saved at all costs, either because the product is of superior quality or because it is needed for seed or other special reason.

DE STEFANI (T.). **Intorno ai costumi di una cimice e i danni che essa reca ad alcuni frutti.** [The Habits of a Bug and the Injury done by it to some Fruits.]—*Allevamenti, Palermo,* iii, no. 9, 25th September 1922, p. 362.

The Pentatomid bug, *Piezodorus incarnatus*, Germ., occurs in Sicily on mulberry, apricot, plum, cherry and other trees. The fruits of late varieties of apple and pear suffer the most, because they are picked late and are therefore exposed to attack for a longer time and the attack is of increased severity owing to the absence of other fruits. As a rule the feeding of *P. incarnatus* on apples and pears results in a number of hard, yellowish depressions on the fruits. The injury is most marked in young fruit, much of which fails to ripen and falls. Hitherto no effective remedy has been found, and a study of the biology of this pest is very necessary.

BAGNALL (R. S.). *Drepanothrips reuteri*, **Uzel, an Addition to the British Fauna.**—*Ent. Mthly. Mag., London,* no. 702, November 1922, p. 248, 1 fig.

Drepanothrips reuteri, Uzel, is recorded from Surrey, where it was taken in rolled oak leaves. Its probable identity with *D. viticola*, Mokr. [*R.A.E.*, A, vii, 195] and its distribution are discussed.

LAING (F.). **A Synonymical Note on** *Orthezia maenariensis*, **Dougl. (Coccidae).**—*Ent. Mthly. Mag., London,* no. 702, November 1922, pp. 254–255.

Re-examination of *Orthezia maenariensis*, Dougl., shows it to be identical with *O. urticae*, L., this synonymy having already been suggested by Lindinger. The genus *Douglariella* (considered by the

author to be a misprint for *Douglasiella*) was erected by MacGillivray [*R.A.E.*, A, ix, 192] with *maenariensis* as type, and this must now be sunk to *Orthezia*, Bosc.

LAING (F.). **Aleyrodidae: Correction of generic Nomenclature.**—*Ent. Mthly. Mag., London*, no. 702, November 1922, p. 255.

It is pointed out that Quaintance and Baker in their "Classification of the Aleyrodidae," part ii (U.S. Dept. Agr., Bur. Ent. Techn. Ser. 27, pt. ii, 1914), assigned *Aleurodes vaporariorum*, Westw., as the type of *Asterochiton*, Mask., while they erected the genus *Dialeurodoides* with *Aleurodes aureus*, Mask., as the type. In the "Contents and Index" to the Classification, published in 1915, the authors, in the corrigenda, p. xi, point out that Cockerell had in 1902 designated *aureus*, Mask., as the type of *Asterochiton*, Mask., and cited *pergandei*, Quaint., as the type of his sub-genus *Trialeurodes*. *A. pergandei* is congeneric with *vaporariorum*, Westw. The synonymy stands, therefore, as follows:—*Asterochiton* (Mask.), Ckll., type *aureus*, Mask. (*Dialeurodoides*, Quaint. and Baker, type *aureus*, Mask.); *Trialeurodes*, Ckll., type *pergandei*, Quaint. (*Asterochiton*, Quaint. & Baker, type *vaporariorum*, Westw.).

BRUNER (S. C.). **Sobre la transmisión de la enfermedad del 'mosaico' ó 'rayas amarillas' en la caña de azúcar.**—*Rev. Agric. Com. y Trab.* (*Cuba*), 1922, v, no. 1, pp. 11–22, 5 figs. (Abstract in *Rev. App. Mycol., Kew*, i, no. 10, October 1922, pp. 342–343.)

As a result of experiments in Cuba on the transmission of mosaic disease of sugar-cane, infection of healthy plants was produced in a low percentage of cases by *Aphis maidis*, but as this insect does not normally attack sugar-cane in the field, it cannot be considered of much importance as a vector of the disease.

Other insects regarded as possible carriers included *Kolla herbida* (*Tettigonia similis*), *Tettigonia* sp., *Draeculacephala mollipes*, *D. reticulata*, *Myndus crudus*, *Stenocranus* (*Delphax*) *saccharivorus*, *Phaciocephalus* sp., *Oliarus* sp., *Monecphora bicincta*, *Pseudococcus calceolariae*, *P. sacchari*, *Sipha maidis*, *Thrips*, *Tarsonemus spinipes*, *Paratetranychus viridis*, *Euscelis bicolor*, *Liburnia* sp., and *Aphis setariae* cf. *R.A.E.*, A, x, 96]. Of these, only *Phaciocephalus* sp. is regarded as worth further investigation; the others are either proved non-carriers or else their activity as transmitters is thought to be negligible. Inoculations with juice from diseased sugar-cane have confirmed the possibility of infection by this means.

LE MOULT (L.). **Le Hanneton et son parasite.**—*Comptes rendus Acad. Agric. de France* [*sine loco*], viii, no. 21, 1922, pp. 596–601. (Abstract in *Rev. App. Mycol., Kew*, i, no. 10, October 1922, p. 355.)

In the course of a campaign against cockchafers in France some 30 years ago the author discovered the fungus, *Isaria densa*, which was used with much success against the insects and practically exterminated them in the fields where it was employed. Cultures were made of this fungus, and also of *I. destructor*, *I. farinosa* and *Sporotrichum globuliferum*, about 5 lb. of the cultures being mixed with 10 gals. of sand or soil and spread on the field before tilling, in the hope of destroying also the larvae of *Anisoplia austriaca*, *Elater segetis* and *Euxoa* (*Agrotis*) *segetum*. The author believes that this method is universally applicable to insect pests, such as the vine moth [*Clysia*

ambiguella], *Phylloxera*, etc. [*cf. R.A.E.*, A, i, 524]. In 1914 a bacillus, which has not yet been identified, was found apparently living symbiotically with *I. densa* in a cockchafer larva. Mixed cultures of these organisms were used against cockchafers and against the peach aphis. The insects were rapidly killed, and this bacillus is believed to be extremely virulent and to cause death in less than 24 hours.

PETCH (T.). **Studies in Entomogenous Fungi.**—*Trans. Brit. Mycol. Soc., Cambridge*, vii, pts. 2 & 3, 1921, pp. 89–167, 3 plates. [Received 14th November 1922.]

The most important entomogenous fungi known to develop on Coccids are the Nectriae, and they are the ones most generally used in the numerous attempts to reduce the numbers of scale-insects by this method. The present paper deals systematically with them, and a list is given of all the species, or their probable conidial stages, that have been recorded on Coccids.

Microcera spp. occur on many species of Coccids in the tropics; *Pseudomicrocera* spp. have been recorded on *Lepidosaphes*, *Aspidiotus*, *Fiorinia*, *Aonidia*, etc.; among the species of *Sphaerostilbe*, *S. coccidophthora* occurs on *Lepidosaphes* sp. and *Parlatoria zizyphi*, *Nectria diploa* occurs on *Fiorinia rubrolineata* and *Lepidosaphes* sp.; *N. coccophila* on *Aspidiotus perniciosus* and *Diaspis pentagona*; *N. barbata*, sp. n., and *N. tuberculariae* on *Lepidosaphes* sp.; *Lisea parlatoriae* on *Parlatoria zizyphi*; *Calonectria coccidophaga* on *Planchonia acaciae*; *Podonectria coccicola* on *L. beckii*, *L. gloveri* and *Parlatoria zizyphi*; *P. aurantii* on *Parlatoria zizyphi* and others; *P. echinata*, sp. n., on *Lepidosaphes* sp.; *Broomella ischnaspidis* on *Ischnaspis longirostris* (*filiformis*); and *Fusarium epicoccum* on *Aspidiotus aurantii*.

COCKERELL (T. D. A.). **The Mealy-bug called** *Pseudococcus bromeliae*, **and other Coccids.**—*Science, Garrison, N.Y.*, N.S., lvi, no. 1446, 15th September 1922, pp. 308–309.

The author questions the validity of the name, *Pseudococcus bromeliae*, Bch., as applied to the species of mealy-bug found on *Tachigalia* [*R.A.E.*, A, x, 348]. He thinks that there is little doubt Bouché had the Lecaniid, *Saissetia hemisphaerica*, Targioni, 1867, before him. Bouché's original description is dated 1834, whereas already, in 1778, a different species had been described as *Diaspis* (*Coccus*) *bromeliae*, Kern., making Bouché's name unavailable.*

The Lecaniid recorded by W. E. Britton as *Toumeyella liriodendri*, Gmelin, from the tulip tree [*R.A.E.*, A, x, 333], is considered to be *T. tulipiferae*, Cook.

The author also does not agree with the adoption of the name *Pseudococcus adonidum*, L., for the common long-tailed mealy-bug, *P. longispinus*, Targ.

The application of the generic name *Coccus*, L., to the soft scales may have to be reconsidered. The original *Coccus* (the word meaning a berry) was the hard round scale of the oak, commonly called *Kermes*, and under the rules a good argument can be made for considering *Kermes ilicis*, L., the type of *Coccus*.

* [Mr. F. Laing, of the British Museum, informs us that the date of *Coccus bromeliae*, Bch., is 1833, not 1834, and that Kerner's species was described as *Coccus bromelia*. He also points out that according to Prof. Cockerell *brevipes*, Ckll., is the same as *bromeliae*, auct., and that this would be the next available name for this insect.—ED.].

Chrystal (R. N.) & Story (F.). **The Douglas Fir Chermes** (*Chermes cooleyi*).—*Forestry Commiss., London*, Bull. 4, July 1922, 50 pp., 9 plates. [Received 9th October 1922.]

A study has been made of *Chermes cooleyi*, Gill., an American species that has lately been noticed damaging Douglas fir in Britain. A general account of this Aphid is given as occurring both in America and in Britain, and biological and morphological keys to the British species of the genera *Chermes*, *Gillettea* and *Cnaphalodes* are appended.

The following summary of the investigation is given by the authors :—*C. cooleyi*, Gill., hibernates upon Douglas fir as a first stage larva. Development commences in early spring, and the first mature stem-mothers may begin oviposition early in April. This brood is dimorphic, about half of the young developing into winged migrants, and the rest into wingless forms on Douglas fir [*Pseudotsuga taxifolia*]. The winged migrants mature about the beginning of May, and fly to Sitka spruce [*Picea sitchensis*], settle on the needles, and lay a small number of eggs. From these eggs hatch the larvae of the sexual generation. This generation has not hitherto been described for *Chermes cooleyi* either in Europe or America. Both male and female sexual forms have been found in Britain, but they have failed to produce offspring. No gall stage on the Sitka spruce has been found, and no winged gall form has been observed settling on the needles of the Douglas fir. There are two broods on the Douglas fir, an early summer brood and a late summer one, which remains on the needles as first stage larvae over the winter.

The species is widely distributed in the south and west of England, and is recorded from a few localities in the midlands and north. In Scotland its distribution is local, and it is so far unknown in Ireland. It has been present in Britain for a number of years, and was undoubtedly introduced on nursery stock, by which means it is now very largely spread. Wind dispersal is, however, known to occur, and other means of infection are not unlikely. The insect has not so far proved a serious enemy of the Douglas fir in established plantations. In consequence of its being confined solely to the needles, it has not the capacity for damage that is possessed by *Chermes* (*Dreyfusia*) *nüsslini*, Ratz., on silver fir. Its importance as an enemy of plants in the nursery and in newly-formed plantations is uncertain. The amount of woolly secretion visible on infested trees in any given area bears no relation to the amount of damage done.

The natural enemies of this Aphid do not seem to play a prominent part in its control. Artificial measures can only be employed in the case of nursery plants and ornamental trees.

For use in nursery beds the authors recommend a spray of $\frac{3}{4}$ to 1 fluid oz. of 98 per cent. nicotine and $\frac{1}{2}$ lb. soft soap in 10 gals. water, 1 fluid oz. of this mixture being diluted with 1 pint of soft water before use. A fine force sprayer should be used, and the lower surface of the needles should especially be treated. An alternative emulsion consists of 2 pints paraffin with 1 lb. soft soap in 10 gals. water. Young plants may be dipped in a solution of 1 lb. soft soap to 1 gal. water, but this is not recommended where other means are available as the plants may suffer from heating in transit. Experiments in the fumigation of infested nursery stock have as yet given inconclusive results.

FINTZESCOV (G. N.). **La Mouche à scie des Prunes,** *Hoplocampa fulvicornis,* **F., Hym., Tenthrédinidé.**—*Insecta, Rennes,* xi, 1921, pp. 6–23, 13 figs. [Received 9th October 1922.]

The life-history and habits of *Hoplocampa fulvicornis,* F., are described in greater detail than formerly [*R.A.E.*, A, ix, 463]. It has generally been considered that the species of sawfly found infesting plums is *H. fulvicornis,* that in apples being *H. testudinea,* that in pears probably *H. brevis,* while that attacking apricots is undetermined. The author believes that the larvae found in pears and in apricots are those of *H. fulvicornis*; he has proved by experiment that the larvae of this species are polyphagous and that they can be reared to maturity on either tree.

BLANCHARD (E. E.). **Aphid Notes. Part I. Argentine Species of the Subtribe Macrosiphina (Homoptera).**—*Physis, Buenos Aires,* v, no. 20, 15th July 1922, pp. 184–214, 14 figs. [Received 10th October 1922.]

The author proposes to publish from time to time the results of his studies on Argentine Aphids, of which this paper forms the first part. Descriptions are given of those species that have come actually under his observation; those recorded by other workers are dealt with only in the keys. Keys are given to the genera of the subtribe Macrosiphina, and to the species of the genera *Macrosiphum, Aulacorthum* and *Macrosiphoniella.*

The species dealt with are :—*Macrosiphum lizerianum,* sp. n., found on *Sonchus* and various Composites; *M. rosea,* L., on cultivated roses; *M. solanifolii,* Ashm., on *Watsonia* and *Lactuca*; *M. sonchi,* L., on *Sonchus* and *Cichorium,* and occasionally injurious to cultivated chicory; *M. urticae,* Schr., on *Urtica, Malva* and *Geranium*; *Aulacorthum eumorphum,* sp. n. (allied to *A. convolvuli,* Kalt.), on *Vinca major*; *A. pseudorosaefolium,* sp. n., on cultivated roses; *Macrosiphoniella beretica,* sp. n., on leaves of an undetermined Composite; *M. chrysanthemi,* del Guer., found commonly on cultivated chrysanthemums (*M. sanborni,* Gill., is very closely allied to this species and may prove to be the same, in which case *chrysanthemi* would become a synonym of it); *M. tanacetaria,* Kalt., var. *bonariensis,* n., on *Tanacetum vulgare*; *Rhopalosiphum* (*Amphorophora*) *lactucae,* Kalt., on *Sonchus* (this species seems to agree with Van der Goot's definition of *R. ribis,* L., which, according to Theobald and others, is synonymous with *R. lactucae,* Kalt.); *Capitophorus tetrarhodus,* Wlk., on cultivated roses; *Myzus persicae,* Sulz., common on *Bellis, Cynara, Malva, Brassica, Solanum, Prunus, Beta, Vinca, Abutilon, Tulipa,* etc., but seldom found on peach, indicating that the usual migration occurring in North America does not take place; and *Neomyzus circumflexum,* Buckt., on *Vinca major.*

LIZER (C.). **Nota crítica y sinonímica acerca de un supuesto nuevo Psyllidae cecidógeno del** "*Ilex paraguariensis,*" **S. Hil.**—*Physis, Buenos Aires,* v, no. 20, 15th July 1922, pp. 325–327. [Received 10th October 1922.]

In the author's opinion, the gall-making Psyllid, described by Brèthes as *Gyropsylla ilicicola* [*R.A.E.*, A, x, 592] is the same as the species described by himself in *Marcellia,* xvi, pp. 103–107, 1917, as *Paurocephala spegazziniana.*

MAYNÉ (R.). **Organisation des mesures internationales de protection entomologique.**—*Ann. Gembloux, Brussels*, xxviii, no. 10, October 1922, pp. 325–339.

The author discusses the balance maintained by nature between all forms of life and explains how man upsets that equilibrium by his industries and by movements of plants and animals. Examples are quoted of insects that have become very injurious owing to removal from their natural habitat to a new one. There is urgent need for international co-operation in the interests of free exchange between nations without fear of the introduction of noxious pests or diseases. Much has already been done on the lines of reform by individuals and various inspection and other services in different countries, but all these efforts need to be co-ordinated into an international organisation under a central control before there can be any far-reaching benefit. The organisation of such a service is briefly outlined.

As a preliminary preventive measure, the plant protection service of each country should draw up a list of all insect pests likely to be introduced, with their geographical distribution. In cases where a pest has already become established, prompt measures should be taken for its eradication, or, if this is not possible, for its reduction to reasonable numbers by rendering its environment less favourable, by such means as the use of more resistant varieties of the plants that it attacks, or the introduction from its original habitat of the natural enemies that occur there. Some outstanding examples of the success of this biological method of control are quoted. It is hoped that a new international conference may be held, on the lines of the Phytopathological Conference held at Rome in 1914 (which was unfortunately nullified by the war) and that an international office for the protection of plants may be definitely established.

MILES (H. W.). **The Apple Blossom Weevil.**—*Jl. Minist. Agric., London*, xxix, no. 7, October 1922, pp. 637–642, 3 figs.

Anthonomus pomorum, L. (apple blossom weevil) was very destructive in 1919 and 1920 in England, and in view of the confusion existing in the literature regarding its life-history and habits, a thorough study of these was made. The weevils leave their winter quarters towards the end of March and pierce the blossom buds of apples and pears, of which they suck the juices. Mating occurs at this time, with alternate periods of feeding and resting, until the buds reach the cluster stage (generally about five weeks after the first appearance of the weevils). Oviposition then takes place, the female piercing the calyx and petals and depositing an egg in the anther lobes. After 8–13 days the eggs hatch, and the young larvae feed on the pollen cells of the anthers. In about three weeks anthers, filaments and styles are destroyed, and the petals dry and form dome-shaped coverings under which the larvae live. These are known as " capped " blossoms. Pupation, within the capped blossom, lasts for about a week, the adult then cutting its way out. This happens in early or late June according to the season. The weevil feeds on the young leaves of the apple for three or four weeks before seeking winter quarters in crevices of the trunks, among dead leaves, beneath hedges or in the soil. Hibernating weevils are often found in numbers close together in favourable situations.

Natural enemies of *A. pomorum* include birds, a fungus (apparently *Isaria* sp.) which destroys many adults, and the Ichneumonid, *Pimpla pomorum*, Ratz. The egg of the parasite is laid in or near the body of the grub, on which the young larva feeds until the host is destroyed [*R.A.E.*, A, vi, 280]. Remedial measures include banding the trees near the crotch, first in late March or early April (before oviposition begins), and again from the end of June onwards, when the weevils are seeking winter quarters. In spring the bands should be examined every day; in the summer once a week is sufficient. Jarring the trees with a padded mallet causes many adults to fall, especially on bright, warm days during the early part of the oviposition period. Many kinds of sprays have been tried; the only one that proved very successful was an unstable paraffin emulsion composed of 0·5 per cent. potash soft soap with 10 per cent. paraffin. The mixture must be kept agitated during spraying, and should be applied in late March to those parts of the tree where the insect is likely to be wintering. When well wetted with spray, the weevils are killed within a quarter of an hour. General attention to clean cultivation and keeping the trees clear of rough bark, mosses and lichens will discourage the pest. Collecting the capped blossoms, destroying the weevils and liberating parasites will also reduce its numbers.

FRYER (J. C. F.). **A New Apple Pest.**—*Jl. Minist. Agric., London,* xxix, no. 8, November 1922, pp. 748–749, 5 figs.

In the spring of 1921 a weevil was found in Norfolk on apple blossoms that differed from *Anthonomus pomorum* (apple blossom weevil), and in August of the same year it was also recorded in Kent. It has been identified as *Anthonomus cinctus*, Kollar (*pyri*, Boh.), which is a well-known pest in Europe, where it occurs more frequently on pears than apples, but has not been previously recorded from Great Britain. These weevils do not feed in the blossom buds, but in the unexpanded leaf or truss buds of apple. It is not known whether the pest is a recent introduction or whether it has been present unnoticed for years. In Germany, eggs are laid in September and October in the leaf and fruit buds of pear trees, larvae being found in the buds from the middle of February and pupating at the beginning of May, the adults emerging 8 or 10 days later. The beetles are said to remain inactive during the summer and reappear for the oviposition period in autumn. The life-history in Britain, which is being investigated, will probably prove to be similar.

COLLINGE (W. E.). **A Local Investigation of the Food of the Little Owl.** —*Jl. Minist. Agric., London,* xxix, no. 8, November 1922, pp. 750–752.

Since the publication of a previous report on the feeding habits of the Little Owl [*R.A.E.*, A, x, 242], the stomach contents of 98 of these birds, taken in various localities in Hampshire where game birds are very generally reared, have been examined, and show that the bulk of the birds' food during June and July consisted of neutral and injurious insects, voles and mice, and earthworms. The number of young game birds taken was infinitesimal.

NEWELL (W.) & BERGER (E. W.). **Insects Injurious to the Principal Crops of the South.**—*Qtrly. Bull. Florida State Plant Bd., Gainesville,* vi, no. 4, July 1922, pp. 97–116.

A brief account is given of the principal insect pests occurring in the Southern States, arranged as far as possible under their respective food-plants, with recommendations for their control. Of these *Platyedra (Pectinophora) gossypiella*, Saund. (pink bollworm), though not causing appreciable damage at present, is considered to be one of the most serious insect problems of the South and great efforts are being made to eradicate it. The other more important pests are *Epilachna corrupta*, Muls. (Mexican bean beetle), the eradication of which is considered impossible, and *Anthonomus grandis*, Boh. (cotton boll-weevil).

A list is given of many pests the introduction of which into the Southern States must be guarded against.

NELSON (T. C.). **The European Pileworm. A Dangerous Marine Borer in Barnegat Bay, New Jersey.**—*New Jersey Dept. Agric. Expt. Sta., New Brunswick,* Circ. 139, 1st March 1922, 15 pp., 8 figs. [Received 10th October 1922.]

Teredo navalis, L. (European pileworm) caused a great deal of damage to piles and other marine structures in San Francisco Bay during 1920 and 1921. A heavy infestation by this marine borer was also found at Barnegat Bay, New Jersey, where, as a result of attack, a cypress platform collapsed. An account is given of this pest, its habits, the injury caused by it and the resulting danger to all marine structures.

KOMP (W. H. W.). **A Study of the Distribution of Hydrocyanic Acid Gas in Greenhouse Fumigation.**—*New Jersey Agric. Expt. Sta., New Brunswick,* Bull. 355, 1st September 1921, 22 pp., 15 figs. [Received 10th October 1922.]

The results of the observations here described have already been noticed from another source [*R.A.E.*, A, viii, 44]. The experimental apparatus is described, and the minimum dose of hydrocyanic acid gas required for the destruction of *Macrosiphum rosae* was found to lie in the neighbourhood of 0·00015 to 0·0002 gramme per litre of air, depending on the temperature. At the higher concentration all Aphids were dead after 15 minutes' exposure at temperatures ranging from 40°–100° F. With the lower concentration the same results were obtained only with a temperature of 100° F., or with 80° provided the exposure was continued for 30 minutes. This effect of temperature may explain the high percentage of gas required to produce killing effects in greenhouses, where as a matter of safety for the plants the temperature is kept low during fumigation.

HEADLEE (T. J.). **Report of the Department of Entomology, 1920–21.**—*Rept. New Jersey Agric. Expt. Sta., 1920–21, New Brunswick,* 1922, pp. 351–408, 25 tables, 2 figs.

During 1920–21 Aphids were more injurious to orchards, although the number of eggs deposited was materially less than in the previous year. The predominant species were *Aphis sorbi* (rosy aphis) and

A. pomi (green apple aphis), the latter reappearing in midsummer on new growth, curling the foliage and staining the fruit. Peas were considerably damaged by *Acyrthosiphon* (*Macrosiphum*) *pisi* (pea aphis) and *M. solanifolii* (pink and green aphis). *Eriosoma* (*Schizoneura*) *lanigerum* caused little damage, though present in unusual numbers. *Myzus cerasi* caused the usual amount of damage. Pears were much damaged by *Psylla pyricola* (pear psylla). *Cydia* (*Laspeyresia*) *molesta* showed a marked increase in numbers and seriously attacked fruit early in the season.

Macrodactylus subspinosus (rose bug) was unusually abundant, but the self-boiled lime-sulphur treatment again proved effective. *Epitrix cucumeris* (potato flea-beetle) occurred early in the season in large numbers, and in some parts potatoes were seriously damaged. Coating with Bordeaux eliminated some injury.

Conotrachelus nenuphar (plum curculio) did much damage to apple, peach and plum that had been unprotected. Some control was obtained during the period of attack by a complete coating of common spray mixtures. Owing to the increased spread of *Popillia japonica* (green Japanese beetle), efforts to exterminate it were abandoned, and attention was devoted to delaying its spread by quarantine and artificial control measures and the introduction and establishment of natural enemies.

Experiments are described on the effect of atmospheric moisture on the metabolism of *Bruchus obtectus* (bean weevil) [*R.A.E.*, A, x, 43]. The effects on seeds of various methods of subjecting them to low atmospheric moisture for protecting them against seed-infesting insects are given.

Investigations have proved that dusting is almost as effective as liquid sprays in controlling the common insects on peach, but on apple, *Cydia pomonella* and *Conotrachelus nenuphar* cause twice as much injury to dusted fruit as compared with sprayed fruit. Dusting materials should be fundamentally investigated to make them adhere and to render them as effective against sucking as against chewing insects. It has been proved in New Jersey that nicotine-impregnated dusts destroy a higher percentage of the oat aphis [*Siphonaphis padi*] and apple leaf-hopper [*Empoasca mali*].

Brood studies and methods of control of *Cydia pomonella* have been continued. So far the existence of only two broods is indicated. Spraying controls the larvae entering the blossom end, but does not always control those entering the sides. The idea that thorough control of larvae entering the blossom end will result in a satisfactory control of the second brood has been disproved in parts of the State badly infested by both broods, and in these the second brood has caused double the damage. Experiments are being made to determine the value of changes in spray schedules designed to effect side control of both broods.

PETERSON (A.). **Experiments with Various Substances for the Control of the Peach-tree Borer,** *Sanninoidea exitiosa*, **Say.**—*Rept. New Jersey Agric. Expt. Sta., 1920–21, New Brunswick,* 1922, pp. 378–388, 1 table.

Experiments with various substances for the control of *Aegeria* (*Sanninoidea*) *exitiosa*, Say (peach-tree borer) were made during 1920–21 and included asphalt compounds, hydrated lime, mercuric chloride, sodium sulpho-carbonate, sodium cyanide, orthodichlorobenzene and paradichlorobenzene. No product used prevented the entrance of

all the larvae. Gipsy moth tree-banding material brought about the greatest reduction in the number of larvae in a tree, and best withstood weather conditions and tree growth. Paradichlorobenzene gives promise of becoming a valuable insecticide for this pest, and much of the information here summarised has already been noticed [*R.A.E.*, A, viii, 189; ix, 325]. Application is best made after all the eggs have hatched, in the north after 15th September and in the south immediately after the 1st October. Applications made late in August or early in September kill the larvae but do not prevent the entrance of newly-hatched individuals. If an application is to be made early in the season, the best time is from 1st May to 15th June.

Froggatt (W. W.). **French Bean Fly** (*Agromyza phaseoli*).—*Agric. Gaz. N.S.W., Sydney,* xxxiii, pt. 8, 1st August 1922, p. 552.

The eggs of *Agromyza phaseoli*, Coq. (French bean fly) are laid in the stem of French beans, where the larvae feed and cause decay. Suggested remedies are banking the beans with earth right up to the stem, so that the action of the fly is checked and the beans throw out fresh roots above the damaged portion; and clean cultivation and the removal and destruction by fire of all old bean stalks when the crops are gathered.

Watson (E. B.). **The Food Habits of Wasps** (*Vespa*).—*Bull. Chamb. Hortic., London,* i, no. 2, October 1922, pp. 26-31, 5 figs.

The food of *Vespa* spp. consists largely of Diptera. One observation on a colony of about 60 workers showed 227 flies to be brought to the nest within an hour. In another nest examined about 90 per cent. of the flies brought in were Muscids. Larvae of *Pteronus* (*Nematus*) *ribesii* (gooseberry sawfly) are also attacked by both queen and worker wasps. Insects that were eagerly devoured by wasps when offered to them included blue-bottles and other Muscids, Tipulids, and Jassids. Wasps should undoubtedly be regarded as beneficial insects and should be protected.

Bentley (G. M.). **The Mexican Bean Beetle a new and serious Pest in Tennessee.**—*Tennessee State Bd. Ent., Knoxville,* Bull. 41 (xi, no. 2), June 1922, 15 pp., 13 figs. [Received 12th October 1922.]

Owing to the continued spread of the Mexican bean beetle, *Epilachna corrupta*, Muls., a brief and popular account is given of its appearance in various stages and of its habits. Hand-picking and dusting with 1 part calcium arsenate and 9 parts hydrated lime or with 1 part sulphur and 4 parts hydrated lime should be carried out as soon as the pest is found.

MacLennan (A. H.). **New Methods developed in Control of Insects and Fungus Diseases.**—*17th Ann. Rept. Ontario Veg. Growers' Assoc., 1921, Toronto,* 1922, pp. 32-38.

Work on the cabbage root maggot [*Phorbia brassicae*, Bch.] has confirmed the efficacy of the treatments previously suggested [*R.A.E.*, A, ix, 127, 128, 372]. In conjunction with Prof. Caesar, a good deal of further information regarding this pest was obtained. There are three generations, and a partial fourth one in a year. Oviposition

generally begins about two days after emergence, as many as 117 eggs being laid by one female. Adult life apparently lasts three or four weeks. Some of the pupae spend two winters in the soil, thus making a two-year life-cycle. The best time for the application of mercury bichloride is when European plums are in full bloom, or when American plums have just begun to blossom ; a second application is given seven days later. For radishes and seed-beds of cabbage or cauliflower, the second application should be made not more than five or six days after the first.

For control of the onion maggot [*Hylemyia antiqua*, Meig.] there is much doubt as to whether poison baits or trap crops are the better, and unfortunately the season's results were inconclusive ; further trials will be made. An effective remedy for the tarnished plant-bug [*Lygus pratensis*, Fall.], which is the cause of heart-rot in celery, is a dust mixture of 20 parts Bordeaux (11 per cent.), 30 parts lime, 20 parts sulphur and 30 parts tobacco dust. This should be dusted thoroughly into the hearts of the plants once each week. Care must be taken to get a suitable machine for this work.

McLaine (L. S.). **Insect Legislation in Canada.**—*Scientific Agric., Ottawa*, iii, no. 2, October 1922, pp. 51-54.

This is a brief review of the Federal legislation at present in force in Canada. The difficulties that would arise if legislative control had to be extended to some basic commodity such as wheat or rice are indicated. Inspection and treatment should be carried out, if necessary, previous to shipping. The fact that common minor pests in one country may be major pests in another is emphasised, and exporters should endeavour to keep their premises free from such insects. Canada is in a fortunate position, as she is not liable to the attack of foreign pests originating in the tropics, and unfortunate, in that she has not the diversity of climate of the United States, which permits the propagation of sufficient quantities of nursery stock to meet internal needs.

Brittain (W. H.). **The Adult Habits of the Apple Sucker (*Psyllia mali*, Schmidberger).**—*Scientific Agric., Ottawa*, iii, no. 2, October 1922, pp. 59-64, 3 tables.

The relative activity of the adults of *Psylla* (*Psyllia*) *mali*, Schmidb. (apple-sucker) is dependent on temperature and sunlight ; under certain conditions they remain immobile for considerable periods, particularly at night. They show a tendency to cluster together on the lower surfaces of the leaves, but they do not feed as extensively as the nymphs. The number of females increases in proportion to that of the males as the season advances.

In 1921 there was a noticeable diminution in the number of insects in infested orchards in the third week in June for a month, when their numbers began to increase again. On 1st August they were fairly numerous on trees near orchards, diminishing rapidly as the distance increased. The relative abundance of the insect at various periods and on various trees is recorded. On 9th August the infestation on apple trees had increased 100 per cent., with a reduction of 12 per cent. on forest trees. On 21st August there was a reduction of 16 per cent. on apple trees, but during the same period there was a much greater proportional decline on forest trees. This reduction continued until

about the middle of September, when the numbers on apple began to rise, and continued to do so into October ; at this time the infestation on wild trees was insignificant. Figures are not available for the period prior to 1st August, but it is known that there is an outward migration from the orchard to wild trees and a later return migration. It is not yet known to what extent natural control or other causes affect the rise and fall of the insect in orchards.

Investigations into the rate of reinfestation show that where the pest has been controlled during the early part of the season, sufficient numbers of new individuals from neighbouring, untreated orchards may occur during the summer and autumn to reinfest the orchard for the following year. It appears to be difficult to employ methods that will destroy the adults over a large area late in August before oviposition.

Notes are given on the mating and egg-laying habits of this Psyllid. Eggs are laid preferably on the smaller twigs of older trees of bearing age.

CUSCIANNA (N.). **Osservazioni sull' attrazione esercitata dagli odori sugli insetti.** [Observations on the Attraction exercised on Insects by Odours.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric., Portici*, xv, 25th June 1922, pp. 226–253. [Received 14th October 1922.]

The author's experiments were made in 1920–21, the odours used being grouped as aromatic, ethereal, balsamic, and nauseous. Detailed results are given.

The attraction of odours is almost exclusively confined to Diptera. Among the Diptera the families chiefly affected were Anthomyiids, Tachinids and Ortalids, represented respectively by 29·01, 25·50 and 41·60 per cent. of the total catches, the Drosophilids being the principal family in the remainder. Among the Ortalids the genus *Platystoma* occupies the first place. It is not sensitive to balsamic or ethereal odours, but all others indifferently are attractive. Some hundreds of *Euxesta nitidiventris*, an American species probably imported into Italy with dried fruit, were taken with vinegar only. Among the Anthomyiids the genera *Anthomyia* and *Hylemyia* are responsive to odours of all the groups tested ; the genus *Muscina* is taken in large numbers with vinegar or nauseous-smelling substances. Among the Tachinids the genus *Lucilia* is captured in abundance with nauseous odours, while *Calliphora* and *Sarcophaga* behave uniformly towards odours.

Among insects of other Orders, Noctuids among Lepidoptera and wasps among Hymenoptera are responsive to odours, the respective proportions being 1·35 and 0·60 per cent. of the total number of insects caught.

Vinegar and fruit ferments attracted the majority of *Platystoma*, carrion and garbage flies, Noctuids and wasps. Vinegar attracts all Diptera sensitive to odours. Ethereal and balsamic odours are inferior to vinegar and nauseous odours. Aromatic and other odours tried were found to have a very feeble effect, or none at all. Vinegar becomes less attractive when diluted. Flower and fruit essences become more attractive. The largest number of Diptera were captured with strengths of 1 : 100, 1 : 500 and 1 : 1,000, the optimum for balsamic odours being 1 : 100, and 1 : 500–1 : 1,000 for ethereal odours. The surrounding conditions are of importance. Calm, windless days with a temperature between 22° and 30° C. [71·6° and 86° F.] provide the best conditions.

GRANDI (G.). **Studi sullo sviluppo postembrionale delle varie razze del *Bombyx mori*, L.**—[Studies on the Post-embryonic Development of the various Strains of *B. mori*.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric., Portici*, xvi, 25th September 1922, pp. 137–206, 14 figs.

The external morphology of the various larval stages of *Bombyx mori*, L., is described in detail, and a key to these stages is given.

BONDAR (G.). **Cacao. A cultura y as pragas do cacaoeiro no Estado da Bahia, Brasil.** [The Cultivation, Diseases and Pests of Cacao in the State of Bahia, Brazil.]—*Secretaria Agric., Viação, Industria e Obras Publicas, Bahia*, 1922, 68 pp., 35 figs.

The insect pests of cacao in Bahia include *Heliothrips rubrocinctus* and two Orthoptera that oviposit on the trunk and branches. One of the latter lays its eggs beneath the bark in triangular patches placed in pairs and the other in parallel rows. The eggs of the former are parasitised by a Scelionid, *Baryconus* sp.

Rhynchota that attack cacao are a Capsid bug, *Mosquilla vastatrix*, and Membracids, Aphids and Coccids. About ten species of Membracids infest this crop, including *Tragopa picta*, F., and *Bolbonota nisus*, Germ., and their sugary excretions attract many ants that protect them against various enemies. An Aphid, *Toxoptera aurantii*, Boy. (*theobromae*, Schout.), does much damage to cacao and also infests oranges. Its natural enemies include a Coccinellid (*Neda sanguinea*) and Syrphid flies. About ten species of Coccids infest cacao. They are protected by ants, without which they would fall easy victims to their enemies.

Among Coleopterous pests *Erodiscus* sp. bores into the branches, in which the eggs hatch and the larvae develop. Infested branches must be cut off and burned. Several Chrysomelids that attack cacao, such as *Omoplata nigrolineata*, Boh., do little damage, but a species of *Noda* is a very serious pest of the foliage throughout the cacao-growing area. A leguminous shade-plant (*Inga*), grown among cacao, is also attacked and would appear to be the preferred food-plant. The adults may be jarred on to sheets in the early morning or late evening. Two common Longicorn borers, *Steirastoma depressum* and *Trachyderes succintus*, are stated not to attack living wood, and the author doubts whether the first-named is the dangerous pest it has been alleged to be.

A number of unidentified Lepidoptera feed on the foliage, and some attack the outside of the pods; a Geometrid and a Psychid are among the most harmful.

Many ants, including *Dolichoderus bispinosus*, Ol., *D. bidens*, L., *Azteca chartifex*, Forel, *Solenopsis geminata*, F., and *Cremastogaster evalliscens*, Forel, protect sucking insects on cacao, and therefore require measures to be taken against them.

MEYRICK (E.). **Exotic Microlepidoptera.**—ii, pt. 17, October 1922, pp. 513–544. [Published by the author, *Marlborough, Wilts.* Price 3*s*. a part.]

Of the new species described, the following were bred from plants of economic importance:—*Eucosma defensa*, from larvae feeding on leaves of *Pongamia glabra* in Fiji; *Bactra graminivora* and *B. commensalis*, mining stems of *Cynodon dactylon* in Bengal and Bombay; and *Lobesia sitophaga*, from ripening seed of millet in Uganda.

Cole (C. F.). **Two new Varieties of Blight-proof Apple.**—*Jl. Dept. Agric. Victoria, Melbourne*, xx, pt. 8, August 1922, pp. 491–493, 2 figs.

Two new varieties of apple that appear to be immune from attack by *Eriosoma lanigerum* (woolly aphis) are described.

Illingworth (J. F.). **Natural Enemies of Sugar-cane Beetles in Queensland.**—*Queensland Bur. Sugar Expt. Sta., Brisbane*, Div. Ent., Bull. 13, 1921, 47 pp., 8 plates, 5 tables. [Received 16th October 1922.]

This work is a compilation of information respecting the various natural enemies of sugar-cane beetles in Queensland. These include diseases [*R.A.E.*, A, ix, 454], predatory mammals, lizards, frogs, birds, predacious and parasitic insects, mites and centipedes.

The predacious insects are Asilids, of which *Promachus doddi*, Bezzi, is the most abundant, a large Elaterid, *Agrypnus mastersi*, Pascoe, a Pentatomid, *Amyotea hamata*, Wlk., a Tabanid, and an ant, *Pheidole megacephala*, F.

Parasitic insects include the Scoliids, *Campsomeris radula*, F., *C. tasmaniensis*, Sauss., *C. ferruginea*, F., *C. carinifrons*, Turn., *Scolia formosa*, Guér., *Discolia soror*, Sm., *Liacos insularis*, Sm., *Anthrobosca morosa*, Sm., and *Tiphia intrudens*, Sm., var. *brevior*, Turn.; the Thynnids, *Zaspilothynnus vernalis*, Turn., *Thynnus pulchralis*, Smith, *Epactiothynnus bipartitus*, Turn., and *E. opaciventris*, Turn.; the Dexiids, *Rutilia inornata*, G. & M., *R. splendida*, Don., *R. pellucens*, Macq., and *Amenia imperialis*, R.-D.; and two Tachinids. *Hyperalonia funesta*, Wlk., and *Emenadia cucullata*, Macleay, are hyperparasites and infest the Scoliids.

A very full annotated bibliography is appended.

Illingworth (J. F.) & Dodd (A. P.). **Australian Sugar-cane Beetles and their Allies.**—*Queensland Bur. Sugar Expt. Sta., Brisbane*, Div. Ent., Bull. 16, 1921, 104 pp., 17 plates. [Received 16th October 1922.]

A detailed description is given of the bionomics and control of, and the injury caused to sugar-cane by, *Lepidoderma albohirtum*, Waterh. (grey-back cane beetle) and *Lepidiota frenchi*, Blackb. A list of 50 related cane beetles and their allies is also given, and the possibilities of determining species by the characters of the male genitalia are emphasised. A botanical survey of the area surrounding cane fields with regard to the aerial life of *L. albohirtum* shows the number and variety of trees used for food by the adults and the frequent close relationship between food plants and those immune from attack. An annotated bibliography of 110 works is appended.

Harris (J. B.). **Orchard Notes for the Northern District.**—*Jl. Dept. Agric. S. Australia, Adelaide*, xxvi, no. 2, 15th September 1922, pp. 158–159.

The boring beetle, *Bostrychopsis jesuita*, F., which is indigenous in South Australia, living ordinarily in native timber, has recently been discovered in an apricot tree, which it had apparently killed. The insect is common in Queensland, New South Wales and Victoria.

Only adults have been observed. Eggs are said to be laid on the trunk of the tree ; the larvae tunnel in the trunk and branches longitudinally until the tree dies. Unhealthy trees are preferred for attack, though vigorous ones are sometimes infested. The beetle evidently has considerable powers of flight, as no timber occurred in the immediate vicinity of the orchard tree attacked.

MORRISON (H.). U.S. Bur. Ent. **On some Trophobiotic Coccids from British Guiana.**—*Psyche, Boston, Mass.*, xxix, no. 4, August 1922, pp. 132–152, 2 plates.

All the Coccids dealt with in this paper are related to ants, these relations having a common peculiarity ; in all the cases the ants are supplied with food in the form of a secretion or excretion elaborated from the juices of the plants. Wasmann has designated these relations trophobiosis to distinguish them from myrmecophily proper.

The species dealt with are *Stigmacoccus asper*, Hempel, found in a large colony of *Cremastogaster* sp. (near *acuta*, F.) under the bark of a large tree ; *Pseudococcus bromeliae*, Bch. (this species is subject to a certain degree of variation in respect of the structural characters that are at present regarded as of taxonomic value, but in spite of recent suggestions [*R.A.E.*, A, x, 604] the author prefers to retain this name until further evidence as to its correct systematic position has been obtained) ; *P. rotundatus*, sp. n., from cavities of stems of *Cecropia angulata*; *Farinococcus multispinosus*, gen. et sp. n., from cavities of stems of *Triplaris surinamensis* with a new species of *Pseudomyrma*; *Ripersia petiolicola*, sp. n., from hollow bases of leaf petioles of *Tachigalia paniculata* ; *R. subcorticus*, sp. n., under the bark of a living tree ; *Akermes quinquepori*, Newst., for which additional descriptive notes are given, taken beneath the bark of *Ficus* (*ulmifolia* ?), inside hollowed-out twigs of *Pithecolobium saman*, and also from an unknown tree in Trinidad ; and *A. secretus*, sp. n., in cavities of stems of *Triplaris surinamensis*, and also in branches of *Inga laurina* (guamá) from Porto Rico, under the bark of *Hematoxylon campechianum* (logwood) from Grenada, and in Tobago and Trinidad.

Akermes (*Pseudophilippia*) *inquilina*, Newst. [*R.A.E.*, A, viii, 119] is considered to have little or no relationship to the genotype of *Pseudophilippia* and is obviously related to the two preceding species. According to the figures and somewhat incomplete description it stands in an intermediate position between *quinquepori* and *secretus*.

BRUES (C. T.). *Conoaxima*, **a New Genus of the Hymenopterous Family Eurytomidae, with a Description of its Larva and Pupa.**—*Psyche, Boston, Mass.*, xxix, no. 4, August 1922, pp. 153–158.

This new genus includes two new species, *Conoaxima aztecicida* parasitising queens of *Azteca constructor*, Emery, and *A. alfaroi*, Emery, in British Guiana, and *C. affinis* attacking *Azteca* in Guatemala.

ESSIG (E. O.). **A New** *Aphis* **on California Sage.**—*Jl. Ent. & Zool., Claremont, Cal.*, xiv, no. 3, September 1922, pp. 61–62, 1 fig.

Aphis hiltoni, sp. n., is described from the Laguna Canyon, California, where it was found in dense colonies on the apical twigs of California sage (*Artemisia californica*).

BÖRNER (C.). **Die Vernichtung der Reblaus durch vorübergehenden Anbau von Pfropfreben.** [The Destruction of the Vine Louse by the temporary Cultivation of grafted Vines.]—Reprint from *Der Deutsche Weinbau*, n.d., 2 pp. [Received 19th October 1922.]

In a preceding paper the planting of vines immune and half-immune from *Phylloxera pervastatrix* (apparently the only form in Germany) was advocated and that of resistant varieties was objected to [*R.A.E.* A, x, 255].

Experiments are needed to settle whether the south European form, *P. vastatrix*, is unable (as the author supposes) to thrive in Germany. The planting of resistant vines implies that the cultivation of this type alone would have to be continued indefinitely, whereas if such vines were prohibited and only immune or half-immune stocks were grown, grafting would serve as a weapon for the destruction of the pest and could be abandoned entirely when all traces of infestation had died out. Research is necessary to determine whether the southern and northern forms of *Phylloxera* are the same, with a gradual specialisation of the latter to certain varieties of vine, or whether the northern forms are more closely related and constitute a sub-species differentiated from the southern.

SPEYER (W.). **Zur Kenntnis der Lebensweise und Bekämpfung des Apfelblütenstechers** (*Anthonomus pomorum*). [A Contribution to the Knowledge of the Habits and Control of the Apple Blossom Weevil.]—*Nachrichtenblatt deutsch. Pflanzenschutzdienst, Berlin*, ii, no. 10, 1st October 1922, pp. 82-83.

Observations made near Naumburg, in 1922, show that when the adults of *Anthonomus pomorum* emerge from hibernation the males are mature and ready to mate. The first eggs, however, are not ready for deposition until about a fortnight later. A female lays about 100 eggs. Only two-thirds of the individuals taken in March and April died between the end of the oviposition period and mid-July, and some were alive in September. On the other hand young adults were taken in June and July. On 24th July three old adult females with large ovaries and full spermathecae were captured. It is therefore possible that the weevil lives for two years and has two oviposition periods. Experiments showed that arsenicals are of doubtful value against this weevil, but further work is being done on the point.

Bekanntmachung vom 17. Juli 1922 über die Schädlingsbekämpfung mit hochgiftigen Stoffen. [Notice of the 17th July 1922 regarding Pest Control with highly poisonous Substances.]—*Nachrichtenblatt deutsch. Pflanzenschutzdienst, Berlin*, ii, no. 10, 1st October 1922, p. 86.

This regulation, with effect from 1st October 1922, restricts the use of hydrocyanic acid and similar intensely poisonous materials to Government departments, research institutes and such bodies as may be specially approved of by the Imperial Ministry of Food and Agriculture.

Zacher (F.). **Die Mehlmotte u. ihre Bekämpfung.** [The Meal Moth and its Control.]—*Biol. Reichsanst. Land- u. Forstw., Berlin*, Flugblatt 16 (3rd edn.), May 1922, 4 pp., 7 figs. [Received 19th October 1922.]

The life-history and modern methods of control of *Ephestia kühniella*, Z., are briefly described.

Zanon (V.). **La Larva triungulina di** *Meloë cavensis* **(Petagna) dannosa alle Api in Cirenaica.** [The Triungulin Larva of *M. cavensis* injurious to Bees in Cyrenaica.]—*L'Agric. colon., Florence*, xvi, no. 10, October 1922, pp. 345–354, 5 figs.

Meloë cavensis kills numbers of honey bees in Cyrenaica. In 1918 the author observed at Bengasi many dead bees in the hives, and found that the minute larvae of this beetle had penetrated between their abdominal segments. These larvae infested the flowers of Compositae and other plants. It is known that the triungulin larvae of *Meloë* attach themselves to Hymenoptera, in the nests of which they develop, but there does not appear to be any record of the Hymenoptera being killed. At Bengasi the adult beetles appear in November. After mating in December, the females oviposit in the ground in January and February, from 2,000 to 2,500 eggs being laid by each. The only possible means of countering the attack consists in maintaining very large colonies of bees, as it is only these that can provide sufficient workers to clear away the intruders when they enter the hive. Weak colonies and old queens must be destroyed. A full description of the Meloid larva is given.

Borgmeier (T.). **A cuyabana é formiga nociva.** [*Prenolepis fulva* is an injurious Ant.]—*Chacaras e Quintaes, S. Paulo*, xxvi, no. 3, 15th September 1922, p. 192.

In view of statements that *Prenolepis fulva*, Mayr, is an enemy of *Atta sexdens*, L., it is pointed out that experiments made in the past by competent observers have shown that this use of *P. fulva* is of no practical value and cannot be weighed against the losses due to it.

Os insectos damninhos. xxii. Uma coleobroca da bananeira, *Cosmopolites sordidus*, **Germ. xxiii. Os escaravelhos do coqueiro.** [Injurious Insects. xxii. A Coleopterous Banana Borer, *C. sordidus*. xxiii. The Coconut Scarabaeids.]—*Chacaras e Quintaes, S. Paulo*, xxvi, no. 3, 15th September 1922, pp. 197–200, 3 figs.

The banana weevil, *Cosmopolites sordidus*, Germ., is recorded as occurring near Rio de Janeiro.

A second note deals briefly with rhinoceros beetles and with *Rhynchophorus palmarum*, L., infesting coconuts in Brazil.

Destrucción de los insectos nocivos á los arboles y plantes. [The Destruction of Insects injurious to Trees and Plants.]—*Anales Soc. Rur. Argentina, Buenos Aires*, lvi, no. 4, 15th February 1922, pp. 114–117, 5 figs. [Received 21st October 1922.]

An account is given of the various means, especially spraying, adopted to check insect pests.

BRÈTHES (J.) **El pulgón del manzano o pulgón lanigero.** [The Woolly Apple Aphis.]—*Anales Soc. Rur. Argentina, Buenos Aires*, lvi, no. 6, 15th March 1922, pp. 163-167, 7 figs. [Received 21st October 1922.]

The Biological Institute of the Argentine Rural Society has studied the woolly aphis, *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., which prevents apple-growing in some districts, and has begun experiments with *Aphelinus mali*, Hald., obtained from the neighbouring republic of Uruguay, where it has recently been introduced [*R.A.E.*, A, x, 226]. There is every indication that this Chalcid will prove effective, and parasitised material is being distributed.

FORBES (R. H.). **Moki Lima Beans** (*Phaseolus lunatus*) **in Egypt.**—*Sultanic Agric. Soc., Cairo*, Tech. Sec. Bull. 9, 1921, pp. 1-22, 3 tables, 5 figs. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xiii, no. 1, January 1922, pp. 55-56.) [Received 23rd October 1922.]

Insect pests and diseases have not up to the present seriously menaced *Phaseolus lunatus* in Egypt, and such attacks of grasshoppers (*Euprepocnemis plorans*), *Etiella zinckenella*, and *Bruchus irresectus* as have occurred have been successfully checked.

SCHIERHOLZ (C.). **Economy in Hydrocyanic Fumigation.**—*Oesterreichische Chemiker-Ztg., Vienna*, xxiv, no. 22, 15th November 1921, p. 166. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xiii, no. 1, January 1922, p. 151.) [Received 23rd October 1922.]

In fumigation at low temperatures only from 80 to 84 per cent. of the hydrocyanic acid gas is liberated in three or four hours, the rest remaining in solution. The present cost of cyanide makes it worth while trying to find out some way of reducing the amount used. As hydrocyanic acid gas acts by asphyxiation, its chief antidotes are oxygen and potassium permanganate. An attempt was made to decrease the oxygen content of air by using a solution of pyrogallic acid or by burning vegetable charcoal. In this way it was found possible to decrease the oxygen of the air by 15-20 per cent.; and this was sufficient to render the action of the accumulated hydrocyanic acid gas four times as efficacious, and hence to reduce the consumption of cyanide to one-fourth. In four or five hours all insects and their eggs are destroyed, and after one hour's ventilation the air has become normal.

FAES (H.). **La culture indigène du pyrethre** (*Pyrethrum cinerariaefolium*).—*Prog. agric. & vitic., Montpellier*, lxxviii, no. 43, 22nd October 1922, pp. 394–400, 3 figs.

This paper has been noticed from another source [*R.A.E.*, A, x, 231].

PETTEY (F. W.). **The Control of Red Scale in Pear Orchards.**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, v, no. 4, October 1922, pp. 337–342.

This paper records spraying experiments conducted at Elsenburg against *Chrysomphalus aurantii* (red scale) during the 1920–22 fruit seasons. The conclusions reached confirm those previously recorded [*R.A.E.*, A, ix, 579]. Instructions are given for slight modifications of the sprays to suit various kinds of pears and varying conditions of infestation with other pests or diseases.

PETTEY (F. W.). **Arsenical Spray Experiments for controlling Codling-moth in Pears at Elsenburg.**—*Jl. Dept. Agric. Union S. Africa, Pretoria,* v, no. 4, October 1922, pp. 360–363.

Experiments against codling-moth [*Cydia pomonella*, L.] have been continued [*R.A.E.*, A, x, 7]. It was found that trees sprayed with calcium arsenate had from 10 to 33 per cent. more infested fruit than those sprayed with lead arsenate. Tests made during the last two years clearly indicate, in spite of assertions to the contrary by various authors, that neither lime-sulphur nor Bordeaux, when used in combination with lead arsenate at the concentration usually advised, destroy the efficiency of lead arsenate in codling-moth control more than from 1 to 5 per cent. Their use is therefore advised, at a minimum concentration of 1¼ lb. lead arsenate powder or 2½ lb. paste in 40 gals. of diluted Bordeaux or lime-sulphur. According to the data obtained in 1919–20 [*loc. cit.*] any weaker solution would give less satisfactory results.

Calcium caseinate, made according to Lovett's formula, by mixing 1 lb. fine hydrated lime with 5 lb. fine casein, was used in the proportion of ½ lb. of the mixture slowly added to each 40 gals. of diluted lead arsenate, but this spreader seemed to have no influence on the efficiency of the lead arsenate [*cf. R.A.E.*, A, viii, 372]. Investigations on the effect of spreaders will be continued.

VOUKASSOVITCH (P.). **Observations sur la Cochylis et l'Eudémis faites à Monlon pendant l'hiver 1921–1922.**—*Rev. Zool. agric. & app., Bordeaux,* xi, nos. 4 & 5, April & May 1922, pp. 61–66 & 74–78, 2 figs.

During the observations made in the vicinity of Toulouse in the winter of 1921–22 the majority of the cocoons of the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] were found under the bark at the angles formed by the junction of the main branches of the stock with the stem. Although the winter was comparatively mild and dry, about 70 per cent. of the pupae were destroyed by the fungus, *Spicaria farinosa* var. *verticilloides*, the total mortality, including that due to other causes, amounting to about 96 per cent. These facts confirm the observations made by previous authors that dryness predisposes the pupae to attack by diminishing their powers of resistance. The fungus was easily cultivated on glycerined potatoes in Roux tubes and in nutritive G.S.P. medium (1 per cent. peptone, 5 per cent. saccharose, 3 per cent. glucose and 2 per cent. gelose) in Petri dishes. At 22°–24° [C.] [71·6°–75·2° F.] the mycelium develops very rapidly, the first fructifications appearing after 72 hours. Development is much slower and more irregular at lower temperatures, and in these cases potatoes are a better medium.

FEYTAUD (J.). **Répartition géographique et climatique de la Cochylis et de l'Eudémis.**—*Rev. Zool. agric. & app., Bordeaux,* xxi, no. 6, June 1922, pp. 85–89.

Early records of the occurrence of the vine moth, *Polychrosis botrana*, Schiff., show that it has been known in France for 30 years as a local pest of which little notice was taken. Now practically every vineyard in the country is more or less infested with it. In many of them *Clysia ambiguella*, Hb., already occurred, and it was very noticeable that as the numbers of the former species increased, the latter became

less numerous. In Gironde, for example, where *C. ambiguella* was formerly abundant, it is now quite rare, although the popular name for it is still used to designate both species.

The original habitat of these two pests is unknown, but *C. ambiguella* tends to adapt itself more easily to cool and moist regions and is abundant in the plains, while *P. botrana* prefers the warm hill-sides, though it is also found in company with the former species in the northern vine-growing regions of Europe, such as on the Rhine and Moselle.

KEUCHENIUS (P. E.) & CORPORAAL (J. B.). **Dierlijke Vijanden van** *Hevea brasiliensis*. [Animal Enemies of *H. brasiliensis*.]—Reprint from *Handboek voor de Rubbercultuur in Nederlandsch-Indië*, n.d., *sine loco*, pp. 216–229, 17 figs. [Received 20th October 1922.]

Hymenopterous pests of *Hevea brasiliensis* in the Dutch East Indies are *Oecophylla smaragdina*, an ant much feared by workers because of its painful bite, and which protects some species of scales infesting rubber, and *Ceratina viridissima*, a bee which bores into the cut surface of young stumps after they have been planted, but is of very slight importance.

Among Coleoptera, the larvae of *Dihammus fistulator*, Germ., bore into the wood and must be picked out. *Xylotrupes gideon* feeds on the latex at tap-wounds, but does not rank as a pest. Scolytid beetles attack the trees at points where the bast has been killed or injured, and finally attack the wood in the case of sickly trees. Wounds should be protected with tar, and if the wood is already attacked, the spot may be bandaged with jute material soaked in kerosene, or a coating of tar mixed with fine sand may be used.

In Sumatra the Psychid moth, *Acanthopsyche snelleni*, sometimes occurs in large numbers on *Hevea* and causes injury by feeding on the bark where it has just been tapped. The larval cases should be collected.

Rhynchota include the following Coccids common on *Hevea*: *Saissetia* (*Lecanium*) *nigra*, *Coccus* (*L.*) *viridis*, *Pseudococcus virgatus* and *P. citri*. There is no record of a definitely injurious infestation by these scales, and it is seldom that they occur so abundantly on the ends of the branches as to prevent growth. The white Flatid, *Lawana candida*, sometimes appears in Eastern Java in such masses that the trees seem covered with snow. In spite of its sucking the sap no harm appears to result.

A termite, *Coptotermes gestroi*, is one of the worst pests of rubber. It does not limit itself to dead wood, and not only infests *Hevea* but other plants also, such as coconut, kapok and *Ficus elastica*. Its nests should be traced and destroyed immediately it is observed. A poison-bait composed of 100 parts sawdust and 1 of Paris green is effective, or recourse may be had to an apparatus that pumps in the fumes generated by placing a mixture of 3 parts arsenic and 1 part sulphur on glowing wood charcoal. Other termites found in rubber plantations are harmless.

The locust, *Cyrtacanthacris nigricornis*, sometimes occurs in large numbers in forests of teak and other wild trees and may spread to plantations of *Hevea*.

Injury to nursery plots and plantations by mites has often been reported. Great damage is sometimes done to the young leaves, which fall in such numbers as to cover the ground. In the plantations nothing can be done, but on the seed-beds dusting with sulphur is effective.

KALSHOVEN (L.). **Voorloopig onderzoek van een aantasting van levenden Djati door** *Xyleborus destruens*, **Bldfd.** [A preliminary Investigation of an Infestation of living Teak by *X. destruens*.]—Reprint from *Tectona, Buitenzorg*, xiii, 1920, 26 pp., 2 figs., 2 plates. [Received 23rd October 1922.]

The infestation of young teak trees by *Xyleborus destruens*, Bldfd., has increased the economic importance of this Scolytid in Java, where prior to 1918 it was known only from diseased cacao. The infestation is not readily detected in its early stages, as the bore-holes are inconspicuous and are sometimes covered by the shelters erected by termites. It is indicated by the presence of dust, consisting chiefly of wood debris, on the ground or bark. An attack of older date is revealed by the brown semi-fluid material extruded from the holes and forming, especially after rain, patches on the bark. Sometimes the holes are distributed over the entire trunk up to the crown. After penetrating some distance towards the centre of the trunk the mine divides into two or more branches, which are not always on the same horizontal plane.

Further investigation is needed to elucidate the habits of *X. destruens*; it seems to be a true ambrosia beetle, as the sides of the mines are covered with a grey fungus. The female seems to oviposit at intervals, so that the eggs, larvae, pupae and adults in a mine follow each other. Among 116 individuals collected, only six (supposed) males were found. Parthenogenetic reproduction seems to occur. Nothing certain is known regarding natural enemies.

When the infestation of teak was discovered, it was noticed that the attack occurred in or near old wounds (some of which were due to *Duomitus ceramicus*) or unhealthy parts, or seemed to have spread from such points in otherwise normal trees. It has not yet been proved, however, that the beetle has a definite preference for injured or sickly parts of the tree. The injury does not appear to have any unfavourable physiological effect on the teak trees, but the timber may be so full of galleries as to be fit only for fuel, and the consequent financial loss may be very considerable. Remedial measures require to be worked out, and in the meantime the felling of infested trees is advised. If a tree is slightly attacked near the ground, a liberal application of tar may check the infestation.

KALSHOVEN (L.). **Zoölogische Bijdragen.** [Notes on Forest Zoology for the Dutch East Indies.]—*Tectona, Buitenzorg*, xv, no. 8, 1922, pp. 677–693, 1 plate. (With a summary in English.)

Since the creation in 1918 of a new department for forest protection problems at the Forest Research Institute at Buitenzorg, the systematic collection of data on injurious animals, especially insects, has been carried out. Preliminary information, not suitable for bulletins, will be published under the above heading.

A twig-borer, *Margaronia caesalis*, Wlk., attacks *Artocarpus integrifolia* in mixed forest plantations in Java. Repeated injury checks the growth of the saplings. This Pyralid also occurs on saplings of *Artocarpus rigida* and *A. elastica*. The young larvae were noticed eating the unfolded leaves of the latter and mining in the main-rib. Older larvae seem to bore in the pith of the shoots, making galleries up to 5 in. long, where pupation takes place. In both 1920 and 1921 the borers occurred from January to March—the middle of the wet

monsoon. The larvae may, perhaps, develop during a part of the year in the flower-buds and young fruits, as they have been found in these parts of the jak-tree (*A. integrifolia*) in British India. No definite control can be advised as yet, but the cutting or crushing of the infested tops, together with the pruning away of the lateral branches, might be tried.

KALSHOVEN (L.). **Zoölogische Bijdragen. No. 3. De dierlijke beschadigingen van de Mahonie** (*Swietenia mahagoni*, **Jacq., en** *S. macrophylla*, **King). No. 4. Djati-insecten en de herkomst van** *Tectona grandis*, **Lf., op Java.** [Notes on Forest Zoology for the Dutch East Indies. No. 3. The Injuries by Animals to Mahogany. No. 4. *Tectona grandis* in Java, its Insect Pests and Land of Origin.]—*Tectona, Buitenzorg*, xv, no. 9, 1922, 782–793. (With summaries in English.)

A short preliminary list is given of mahogany pests. *Xyleborus* sp. infests the root, stem and branches of seedlings and young trees. The caterpillar of *Zeuzera coffeae*, Nietn., may cause the larger branches or the upper part of the stem of trees over one year old to wither. A Pyralid twig-borer, *Hypsipyla robusta*, Moore, destroys the tips of the branches and is a serious pest. It also infests the seeds and causes premature dropping of the fruits. Leaf curl, caused by a bug, *Helopeltis* sp., is unimportant. *Attacus atlas*, L., and *Orsonoba clelia*, Cram., are unimportant Lepidopterous pests of the foliage, which is also slightly injured by Orthoptera and a Pentatomid bug. The felled timber is attacked by termites and wood-boring beetles, including Bostrychids.

Some facts are also mentioned in connection with the controversy as to whether teak is a native tree in Java. The common occurrence of *Hyblaea puera*, Cram., and *Zeuzera coffeae*, Nietn. (both found in British India), *Xyleborus destruens*, Bldfd., and *Calotermes tectonae*, Damm. (not found as yet on any other indigenous food-plant in Java, but both apparently absent from British India, the supposed country of origin of teak), and *Duomitus ceramicus*, Wlk. (present in British India, and for which no alternative food-plant has been found there or in Java) in Javanese teak does not necessarily prove or disprove the theory of the importation of teak. Further investigations, especially on alternative food-plants of teak pests, are necessary.

BEEKMAN (H.). **De groote Djati-boorder (oleng-oleng)** *Duomitus ceramicus*, **Wlk.** [The large Teak-borer, *D. ceramicus*.]—*Meded. Proefst. Boschwezen, Buitenzorg*, no. 4, 1919, pp. 1–17, 6 plates. [Received 23rd October, 1922.]

The large teak-borer, *Duomitus ceramicus*, Wlk., is very widespread in Java. The various forms of injury caused by this Cossid are described from the literature.

The duration of the larval stage has not been directly observed. The transition from larva to pupa requires 3–4 days, and at the Forest Experiment Station the pupal stage lasted 32 or 33 days, which compares with 4–6 weeks as indicated by Beeson [*R.A.E.*, A, x, 178]. A few hours before the moth emerges the pupa moves to the entrance of the mine and projects out of it. At Buitenzorg captive adults lived only a few days. The total life-cycle may be assumed to last a year. Pupae were found from February to June, while the moths occurred from March onwards, *i.e.*, at the end of the wet monsoon.

In spite of the general distribution of this moth, mass-occurrences are of a purely temporary and local character. It is quite possible for severe injury to be confined to about two acres of a plantation otherwise free from infestation. The natural enemies of *D. ceramicus* in Java include woodpeckers, nocturnal birds of prey and predacious ants. A case of parasitism by a Tachinid has been observed. There are no promising means of direct control at present, but a better knowledge of the pest may result in more successful measures being evolved. The capture of the moths by light-traps placed in strongly infested situations and the collection of the larvae and pupae are the only methods available. Alternative food-plants, such as *Spathodea campanulata*, should not be allowed in or near teak plantations. As regards infested teak trees, these should not be felled in a tall forest unless such removal is justified as thinning out. Infested trees that must be left standing should be removed during a future thinning.

Beekman (H.). **De Djatitermiet (inger-inger),** *Calotermes tectonae,* **Dammerman.** [The Teak Termite, *C. tectonae.*]—*Meded. Proefst. Boschwezen, Buitenzorg,* no. 4, 1919, pp. 21–30, 5 plates. [Received 23rd October 1922.]

Teak trees in Java are often infested by *Calotermes tectonae*, Damm. It causes enlargements in the trunk, which usually occur between 15 and 30 ft. from the ground, though they may be found between 6 and 60 ft. As many as six such enlargements may be seen on one tree. Careful examination reveals some small bore-holes at these points, and if the trunk is sawn apart, the wood will be found to be much eaten out. Though the life of the tree is seldom threatened, the value of the timber is very considerably reduced. The local weakening may also result in the tree breaking in the wind. The infestation has been observed in trees ranging from 7 to 80 years old.

The various forms and stages of *C. tectonae* (except the egg and the king) are described. Little is known of the life-history of this termite. The vertical mines that link up the various feeding-places (thickenings) have never been seen to go down to the ground, and it is apparent that the termites bore direct into the tree at some height from the ground. At some points the mines communicate with the open air. No other plants than teak are known to be attacked. A colony will remain for some time in a tree that has died, but there is no record of a direct attack on a dead tree. Natural enemies include various birds and bats. It is possible that woodpeckers destroy this termite. The only direct measures are those that aim at killing *C. tectonae* in its mines, and as the latter are at some considerable height and the characteristic swelling only occurs when infestation is established, the practical difficulties are great. They may be diminished by thinning out infested trees as much as possible beforehand. An indirect means of restricting the spread of *C. tectonae* is the interplanting of other trees not attacked by this pest.

Kalshoven (L. G. E.). **De roode Takboorder,** *Zeuzera coffeae,* **Nietner, in Boschculturen.** [The Red Twig-borer, *Z. coffeae,* in Forest Plantations.]—*Meded. Proefst. Boschwezen, Buitenzorg,* no. 4, 1919, pp. 57–65, 2 plates. [Received 23rd October 1922.]

In Java the red twig-borer, *Zeuzera coffeae,* Nietn., occurs between sea-level and about 5,000 ft. It attacks woody plants (tea, cacao, coffee, cinchona and coca—and cotton in British India), such trees

as *Casuarina*, ornamental shrubs, and fruit trees. It has been observed in teak (*Tectona grandis*), *Vitex pubescens*, small-leaved mahogany (*Swietenia mahagoni*), *Cedrela febrifuga*, *C. sinensis*, *Lagerstroemia speciosa*, *Terminalia belerica*, *Bauhinia malabarica*, etc. Thus many trees of importance in forestry are subject to attack.

It is not certain where the eggs are deposited. The egg, larva, pupa and moth are described. The larva mines the branches, but also occurs in the slender stems of young plants and in the stems of plants the twigs of which are too small. The mine consists of two parts, one—less than an inch in length—being a ring-like section beneath the entrance-hole, while the other, extending from the entrance-hole to the tip of the twig, may be some feet long. In teak the mine follows the edges of the pith and wood. No data are available as to the duration of the life-cycle. In 1917-18 the larvae were seen from May to October, during the east monsoon. Moths were bred out at Buitenzorg from the end of October to the beginning of December.

A fungus, a Braconid and birds were among the natural enemies noticed, and Zehntner ascribed the rarity of serious outbreaks of *Z. coffeae* to parasites. Infestation is revealed by the presence of withered twigs or plants. Infested twigs may be cut off and split open to destroy the larvae.

KALSHOVEN (L. G. E.). **De roode Stamboorder,** *Zeuzera postexcisa*, **Hampson.** [The Red Stem-borer, *Z. postexcisa*.]—*Meded. Proefst. Boschwezen, Buitenzorg*, no. 4, 1919, pp. 69–71, 1 plate. [Received 23rd October 1922.]

On felling a trunk of *Phoebe excelsa* fresh mines were noticed in the foot. Larvae bred from these proved to be *Zeuzera postexcisa*, Hmps. The larva, pupa and adult moth are described. Though this species is recorded from British India, no biological data on it are to be found in the literature. It is impossible that *Z. postexcisa* should be confined to *Phoebe excelsa*, and possibly many similar mines found in Java in *Quercus*, Magnoliaceae and Lauraceae are due to infestation by it.

KALSHOVEN (L. G. E.). **Schade door den „ Ringboorder " *Phassus* (?) *damor*, Moore, aan Wildhoutculturen.** [Injury by the Ring Borer, *Phassus* (?) *damor*, to Wild Timber Plantations.]—*Meded. Proefst. Boschwezen, Buitenzorg*, no. 4, 1919, pp. 75–81, 2 plates. [Received 23rd October 1922.]

The Hepialid, *Phassus damor*, Moore, is not rare in western and central Java. It was first noticed as a pest of cinchona. In 1911 Roepke reported it from cacao. Since then it has been found on tea, *Erythrina* and *Albizzia moluccana*. The wild trees infested include *Altingia excelsa*, *Magnolia blumei*, *Schima noronhae*, *Nyssa javanica*, *Glochidion*, *Eugenia*, *Evodia*, *Symplocos*, *Lauracea*, and *Vernonia arborea*. In 1918 a suspected infestation of teak was noticed. The size of the stem and the resultant thickness of the bark seem of more consequence to this ring-borer than the character of the wood. The attacked wild timbers had stems from $\frac{3}{5}$ to $5\frac{1}{2}$ in. thick at the base, and were 2–3 years old. Cinchona of about the same age and thickness is attacked.

The larva, pupa and moth are described. The young larva feeds on the bast, usually at the root-collar, but sometimes higher up, especially if several individuals infest the same stem, in which case

the rings occur above one another. The older larvae attack the young wood as well. Feeding appears to take place at night, and the larva remains in the mine by day. Roepke believes that it is able to migrate from one stem to another. It is possible that the eggs are deposited on the ground, as is the case with European Hepialids. At the Forest Experiment Station only one adult was obtained from a number of larvae, possibly owing to the wood becoming too dry.

In 1917 the first signs of infestation were noticed in January; by March the injury was quite apparent; by May several young larvae were seen, and more or less mature larvae early in July. In September the pupa under observation had not yet given rise to an adult. There thus seems to be only one generation a year.

In former years the chief injury was done to cinchona, from 20 to 50 per cent. of the trees being infested in some places. Roepke states that later on this attack decreased, but that cacao was affected—with some severity on some estates in 1911. Wild timber plantations were in some instances considerably injured in 1917. Remedial measures are needed where conditions in such plantations favour the pest. The larva should be killed at the beginning of its attack, if possible, a piece of pointed or hooked wire being used.

Bedefluens Levevis og Bekaempelse. [Life-history of the Beet Fly and Measures against it.]—*Statens Forsøgsvirksomhed i Plantekultur, Lyngby,* Medd. 91, June 1922, 4 pp., 3 figs.

The life-history of the beet fly (*Pegomyia hyoscyami*), the larva of which mines in beet, spinach, *Atriplex*, etc., is recorded. Two to four generations a year occur in Denmark. Formerly the larvae of the second generation, occurring in July, did the most damage, but now the first generation, occurring in May and June, is the most injurious, as at this time the young leaves are often entirely occupied by the mine. As soon as the attack is discovered and while the larvae are young, the rows must be thinned out in order to let the remaining plants have a better chance of growing; steps must be taken to prevent the larva thus removed from pupating. Spraying has not proved effective.

Aadselbillens Levevis og Bekaempelse. [Life-history of the Carrion Beetle (*Blitophaga opaca*) and Measures against it.]—*Statens Forsøgsvirksomhed i Plantekultur, Lyngby,* Medd. 92, June 1922, 4 pp., 3 figs.

The life-history of *Blitophaga opaca*, which causes great damage to beet in Denmark every year, is recorded. In spring the beet fields are often destroyed by the adult beetles, the attacked leaves showing black edges. The larval attack begins in May or June, and is finished in three weeks, when the larvae are full-grown. During serious attacks thinning must be avoided, as this would increase the infestation on the remaining plants. Spraying with arsenic or barium chloride has proved effective when used stronger than usual, *e.g.*, Paris green three or four times as strong as normally, viz., 3–4 lb. to 100 gals. water, to which solution is added 3–4 lb. chalk and $\frac{1}{5}$ lb. gelatine to make it adhesive. Soap should not be added. Of barium chloride a 4 per cent. solution is used.

BOAS (J. E. V.). **Bladfald fra Bøg i Juni.** [Fall of Beech Leaves in June.]—*Fra Skoven og Traemarkedet, Copenhagen,* iii, no. 14, 15th July 1921, pp. 105–107.

Rhynchaenus (*Orchestes*) *fagi* was exceedingly common in 1921 in the Danish beech forests. The brown marks on the leaves indicating larval mines were so numerous that the forests had a brownish hue. The attacks also seriously affected the development of the nuts. The most characteristic damage was, however, met with on the petioles and median ridges of the leaves, which were gnawed to such a degree that the petiole was broken, resulting in a heavy fall of the leaves and a serious check to the growth of the trees.

THOMSEN (M.). **Bøgeloppen i Skoven og Frugthaven.** [*Rhynchaenus fagi* in Forest and Orchard.]—*Ent. Medd., Copenhagen,* xiii, no. 7, 1921, pp. 336–337.

In addition to the damage to beech forests recorded in the foregoing paper, *Rhynchaenus* (*Orchestes*) *fagi* in 1921 in Denmark also infested the fruits of apple, pear, cherry and plum. Holes of some size were gnawed in the fruits, as many as thirteen individuals occurring in a single hole, with the result that a great quantity of fruit became unsaleable.

ROSTRUP (S.). **Om Krusesyge i Gulerødder og korsblomstrede Kulturplanter.** [On Curly-leaf Disease in Carrots and cultivated Crucifers.]—*Beretning om Nordiske Jordbrugsforskeres Forenings Kongres i København, Juli 1921, Copenhagen,* 1922, pp. 301–312, 2 figs.

The results formerly published [*R.A.E.*, A, ix, 452] on curly-leaf disease in carrot, due to *Trioza viridula*, are reprinted. Spraying with a solution of tobacco or nicotine sulphate containing 0·1 per cent. nicotine is recommended against the ovipositing females just when the leaf curl begins to appear ; this must be repeated twice at intervals of 10 days to destroy the larvae. The attacks in Denmark were heavy in 1900–10, and again in recent years, especially in 1920.

As regards curly-leaf disease in crucifers, due to *Contarinia nasturtii*, the results of Taylor and Dry [*R.A.E.*, A, iii, 500] are recorded and confirmed. Serious outbreaks in Denmark were recorded in 1918 on swedes, and subsequently especially on cauliflowers, fields planted in April 1920 being nearly destroyed. The curled leaves caused the young heads to decay. Early sown fields were the most heavily attacked. As the midges do not fly well or far, the distance from a field infested the preceding year is of great consequence. No effective spray has as yet been found.

BRÈTHES (J.). **Sección Entomológica.** [Report of the Entomological Section.]—*Mem. Trab. Inst. Biol. Soc. Rur. Argentina, 1921–22, Buenos Aires,* 1922, pp. 40–43.

Against *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., biological control by means of *Aphelinus mali*, Hald., promises to be very successful. In timber a Cerambycid, *Hylotrupes bajulus*, L., imported from Europe, is one of many injurious borers. An insect that occurred in large numbers and was suspected of being a pest was found to be a Melyrid beetle, *Astylus quadrilineatus*, Germ., which is beneficial as a destroyer

of many injurious insects. Another useful species observed was an Orthopteron, *Parastagmatoptera unipunctata*, Burm. The unexpected discovery was made of *Diatraea saccharalis*, F., attacking maize in the province of Buenos Aires. Satisfactory results have been obtained by distributing the fly, *Parexorista caridei*, Brèth., a parasite of the bag-worm, *Oeceticus kirbyi*, Lnds. Gldng.

CECCONI (G.). **Manuale di Entomologia Forestale.**—*Florence*, Fasc. 9, 1922, 80 pp., 76 figs. [Received 27th October 1922.]

The ninth part (pp. 513–592) of this work [*R.A.E.*, A, ix, 55] deals with a number of Hymenoptera, including many species that are beneficial as enemies of forest pests.

SULLIVAN (K. C.). **Plant Inspection in Missouri.**—*Missouri Univ. Agric. Expt. Sta., Columbia*, Circ. 101, December 1920, 16 pp., 5 figs. [Received 24th October 1922.]

A brief summary is given of the plant inspection work carried out in Missouri since 1913.

CHITTENDEN (F. H.) & FINK (D. E.). **The Green June Beetle.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 891, 28th July 1922, 52 pp., 10 plates, 7 figs. [Received 25th October 1922.]

A detailed account is given of the various stages, life-history, habits and distribution and natural enemies of *Allorrhina* (*Cotinis*) *nitida*, L. (green June beetle) in the United States, much of the information having been taken from previous authors [*cf. R.A.E.*, A, x, 164].

In addition to the remedial measures already noticed [*loc. cit.*] the use of flowerpots or V-shaped troughs as traps and of poisoned baits, as prepared for cutworms, is recommended in cultivated fields.

RITCHIE (A. H.). **Cotton Weevil.**—*Tanganyika Dept. Agric., Dar-es-Salaam*, Circ. 28, 24th August 1922, 5 pp., typescript.

Apion xanthostylum (cotton weevil), according to German reports, has been confined to the central cotton area of Tanganyika Territory and Amani. Efforts are now being made to discover its exact distribution, and growers are asked to report upon its occurrence and the degree of infestation in their fields. The appearance of the various stages is described. They all occur in the main stem of cotton plants at ground level, at the junction of the main stem and branches, and at the base of the boll, the burrows giving the plant tissues a brownish appearance. Early attack on the main stem leads to complete collapse of the plant ; if the plants are well grown before attack the damage is less serious, although prolonged working in the stems and branches may also induce a sudden collapse. Attack on the branches only leads to poor growth and a light yield, or the branches may wither. The effect of infestation at the base of the boll requires further investigation, but it undoubtedly leads to premature flaring of the boll, and later to withering. The grubs do not, however, enter the boll itself. The method of reporting the occurrence of the pest and of estimating the percentage of infestation is explained, and this method is also applicable to *Heliothis* (*Chloridea*) *obsoleta* (American bollworm), *Earias insulana* (spiny bollworm) and *Platyedra* (*Pectinophora*)

gossypiella (pink bollworm) in the bolls, and to *Alcides brevirostris* (cotton girdler) in the plants. The degree of infestation by the cotton stainers, *Dysdercus* spp. and *Oxycarenus hyalinipennis*, can probably only be estimated more or less approximately.

Heliothis (*Chloridea*) *obsoleta* (American bollworm) attacks the cotton plant in a similar manner to *E. insulana*, and also attacks maize cobs, okra fruits (*Hibiscus esculentus*), pods of *Phaseolus* spp., tomato fruits, etc.

Wild Malvaceae should be examined whenever possible for cotton pests. Cultivated and wild Cucurbitaceae harbour the cotton aphis [*Aphis gossypii*]. Such wild food-plants should be destroyed when growing in the vicinity of cultivated cotton. Care should be taken not to collect or destroy the Reduviid, *Phonoctonus fasciatus*, P. de B., which is a beneficial predator, but which, owing to its resemblance to *Dysdercus* spp., is often mistaken for a pest.

The main crop of cotton should be gathered early and the fields thoroughly cleaned up and all cotton disposed of before 30th November. A dead season of at least two months should be attempted; any possible loss in burning the last few top bolls is more than counterbalanced by the diminution in pests on the subsequent crop.

NEWMAN (L. J.). **Report of Economic Entomologist.**—*Western Australia Dept. Agric., Ann. Rept., 1921–22, Perth*, 1922, pp. 28–30.

New strains of silkworms have been introduced and distributed in Western Australia. The eri silkworm (*Attacus ricini*), the larvae of which feed upon leaves of the castor-oil plant, *Ricinus communis*, is to be introduced from India, and as this food-plant grows freely in the State, the industry should be benefited.

Army worms and web-worms were troublesome from July to October, but in no instance did a crop grown on clean fallow become infested unless by invasion from adjacent dirty stubble. The locust, *Locusta migratoria* ph. *danica* (*Pachytilus australis*), devastated crops and pasturage areas. The attacks are sporadic, and are therefore not systematically dealt with; a campaign against the hoppers in the season when they are at a minimum would largely prevent their appearance in maximum numbers. *Phthorimaea* (*Gelechia*) *operculella* caused much damage to potatoes and tomatos [*R.A.E.*, A, ix, 260]. Experiments showed that storage of infested tubers at an average temperature of 39° F. for 60 days suspended the activities of the larvae. After four months in cool storage the tubers were in good condition.

Chrysomphalus (*Aspidiotus*) *aurantii* (red scale) caused much damage in neglected orchards. The parasite, *Aphelinus fuscipennis*, was beneficial at times, but cannot be relied on, as it is much influenced by weather conditions. The Coccinellids, *Rhizobius debilis*, *Orcus australasiae* and *Chilomenes quadripustulatus*, were sometimes plentiful and reduced the numbers of the scales. Trees that were maintained in good health, with a sufficient water supply, did not suffer seriously. *Ceratitis capitata* (fruit-fly) was more widespread and injurious than for some years past. If a successful fruit crop is to be obtained, the bait-traps that have proved a good remedy [*R.A.E.*, A, ix, 260] must be employed.

Forest-tree pests included the Longicorn, *Binia bicolor* var. *femoralis*, damaging *Eucalyptus gomphocephala* and *E. redunca* var. *elata*. Other

pests of *E. gomphocephala* were the Longicorn, *Phoracantha synonyma*, and the seed weevil, *Haplonyx tibialis*. Ants are also said to destroy these seeds, but the only species noticed in this connection was *Iridomyrmex conifer* (twig mount ant). Dead or dying limbs are frequently infested with the termites, *Coptotermes michaelseni*, *C. raffrayi* and *Leucotermes clarki*. In fallen logs and limbs *Eutermes fumipennis* is frequently found. *Eucalyptus marginatus* was infested by the girdling beetle, *Anilara uniformis*, but it is not certain whether this was the primary cause of death. The egg-stage of the insect has not been discovered. *Banksia verticillata* suffered heavy mortality; in some cases *Cyria vittigera* (banksia girdler) was the cause of death. *B. menziesii* and *B. grandis* were also attacked by this Buprestid, and by a moth, the larvae of which bore in the young wood and defoliate the trees. *Eucalyptus calophylla* is attacked by the Longicorn, *Tryphocharia hamata*, the life-history of which has not been definitely determined. It is hoped to ascertain whether this and other borers in red gum are the cause of the gum veins that render the wood valueless for building.

The introduction and colonisation of various useful parasites has been continued. A consignment of *Habrobracon johannseni*, a parasite of *Phthorimaea operculella*, was received from California, but unfortunately the insects died without reproducing themselves. Further attempts will be made to introduce this and also a parasite of the woolly aphis (*Eriosoma lanigerum*). Many parasites of Coccids were collected and distributed. *Blastophaga grossorum* (fig wasp) is now definitely established, and it is hoped that the fig-drying industry may become a very successful one.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 3, September 1922, pp. 146–148.

Rhabdocnemis obscura, Boisd., is causing much damage to sugar-cane at South Johnstone, where it is hoped to liberate the parasite, *Ceromasia sphenophori*, although climatic conditions and natural enemies may hinder its successful establishment. Observations are given on three larvae that developed bacterial diseases, though attempts to infect healthy larvae with them have not yet been successful.

JARVIS (E.). **Science Notes.**—*Queensland Agric. Jl., Brisbane*, xviii, pt. 3, September 1922, p. 231.

In 1919 experiments were made to determine whether adults of *Campsomeris tasmaniensis*, Sauss., were immune from attack by the entomogenous fungus, *Metarrhizium anisopliae*, and in less than a week after infection of the soil several wasps were found dead. At present it would not appear that the occurrence of this fungus under field conditions would materially affect the spring and summer broods of these Scoliids, but the author is of opinion that in the autumn the fungus kills more Scoliids than Scarabaeid larvae.

BURR (A.). **Parasites des asperges dans les cultures d'Alsace.**—*Bull. Assoc. Philomathique d'Alsace et de Loraine, Saverne*, vi (1921), pt. 3, 1922, pp. 43–52, 2 figs.

The most important pests of asparagus in Alsace are the Chrysomelids *Crioceris asparagi*, L., and *C. duodecimpunctata*, L., and the Trypetid, *Platyparea poeciloptera*, Schr.

The remedial measures against *P. poeciloptera* have been based on the recommendations of Lesne [*R.A.E.*, A, ii, 404; iv, 304]. Birds appear to be the only effective natural enemies.

The Chrysomelids have two or three generations a year, and measures against them include the collection of adults at night and spraying with nicotine or arsenic against the larvae. The most satisfactory spray for general purposes is that recommended by Guenaux [*R.A.E.*, A, vi, 134], and consists of tobacco extract containing ¼ lb. nicotine, ½ lb. carbonate of soda, 2½ lb. black soap, 1 qt. methylated spirit and 25 gals. water. The arsenical spray recommended consists of ½ lb. sodium arsenate in 2½ gals. water mixed with 1½ lb. lead acetate in 2½ gals. water, the total being made up to 25 gals. with water.

VOGELWEID (V.). **La dévastation des houblonnières du Bas-Rhin par le** *Tetranychus telarius*, **L.**—*Bull. Assoc. Philomathique d'Alsace et de Lorraine, Saverne*, vi (1921), pt. 3, 1922, pp. 71–89, 3 figs.

In July 1921 serious complaints were received of the abundance of *Tetranychus telarius*, L. (red spider) in the hop fields around Strasburg, the entire crop being threatened with destruction. The history, description and distribution of the mites are dealt with. Both *T. telarius* and *T. althaeae*, Hanst., were present, and the colours vary between yellow and green, found chiefly on haricot beans, and orange varieties, found on beets. Both kinds are found together on hops, the yellow-green predominating. It seems likely that the variation in colour is merely produced by the choice of food-plant, as either form is equally adaptable to either beans or beets. Hops infested by the mites are retarded in growth and turn yellowish and then red. The leaves dry, roll up and fall. Infestation takes places from the soil, and the mites travel gradually to the top of the plants, the webs giving them a grey appearance. It has been noticed that the mites do not occur on hops when Aphids are present, the latter having been observed to attack them and suck the juices from their bodies. A study of former records of infestation shows that the mites are always particularly abundant in an unusually dry season; they can withstand severe cold, but cannot live in a moist atmosphere, and while there are normally four or five generations in a year, a particularly dry season may produce six or seven. Coccinellids are very useful in reducing the numbers, and sprays of nicotine, black soap and spirits of wine are efficacious if used at the correct periods in the life-cycle.

(N.). **Note sur les dégâts causés à la vigne par la larve d'une noctuelle.** —*Prog. Agric. & Vitic., Montpellier*, lxxviii, no. 44, 29th October 1922, pp. 430–431.

The larvae of *Laphygma* (*Caradrina*) *exigua*, Hb., have been doing considerable damage in vineyards, where they attack the parenchyma of the young leaves and sometimes injure the fruit. As this moth can live on various plants, it is important to clear away all weeds and to practise clean cultivation for a space of four or five yards around a vineyard. The spray recommended consists of 2½ lb. cresyl, 2½ lb. soft soap, 1 lb. sodium carbonate (commercial crystals), 2½ lb. paraffin and 50 gals. water. Another formula is 5 lb. black soap and 1 gill ordinary carbolic acid in 10 gals. water. Care should be taken to spray the mixture lightly over the surface of the leaves and to reach the base of the stems and underneath the leaves, where the larvae are generally found.

Ehrhorn (E. M.). **Division of Plant Inspection.**—*Hawaiian Forester & Agriculturist, Honolulu*, xix, no. 8, August 1922, pp. 184–187.

The pests intercepted in May and June 1922 included: From Japan, *Cremastogaster* sp. and *Camponotus* sp. in logs, and larvae and pupae of a Lepidopterous borer, near *Zeuzera*, in cargo; and from the Philippines, *Bruchus chinensis*, in beans and seed.

Whitney (L. A.). **Division of Plant Inspection.**—*Hawaiian Forester & Agriculturist, Honolulu*, xix, no. 9, September 1922, pp. 216–217.

The pests intercepted in July 1922 included: From China, *Cylas formicarius* and *Pseudococcus* sp. on sweet potatoes; and from Japan, *Pseudaonidia trilobitiformis* and *Parlatoria pergandei* on orange.

Fern Weevil Parasite.—*Hawaiian Forester & Agriculturist, Honolulu*, xix, no. 9, September 1922, pp. 199–200.

A letter from C. E. Pemberton on the fern weevil, *Syagrius fulvitarsis*, and the distribution and effectiveness of its parasite, *Ischiogonus syagrii*, states that the latter has become well established everywhere since its introduction from Australia a year ago. Living larvae or pupae were found near dead weevil larvae. It is too soon for the parasite to have reached its maximum degree of efficiency, but the weevil is most certainly being checked, and has not spread much beyond the area infested by it in 1920.

Myers (J. G.). **Notes on the Life-history of** *Monopis ethelella* **(Newm.) (Tineina, Lepidoptera).**—*N. Z. Jl. Sci. & Technol., Wellington*, v, no. 4, September 1922, pp. 208–209.

Some soiled wool, after infestation by sheep-maggots, was found when in a drier condition, to be infested with *Monopis ethelella*, Newm., and all stages except the eggs, which were not discovered, are described. The moths of the genus *Monopis* are said to find their larval food in refuse. Since rearing the species described, adults were found on the 10th June emerging from woolly debris of a dead sheep. The moths shelter among the caked masses of wool during the day. They have been recorded throughout New Zealand from sea-level to an altitude of 4,000 ft., and are also common in Australia.

Lochhead (W.). **The Story of Spraying Mixtures.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21, Quebec*, 1921, pp. 12–19. [Received 31st October 1922.]

The contents of this paper has already been noticed from another source [*R.A.E.*, A, x, 317].

MacClement (W. T.). **Our Winged Allies.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21, Quebec*, 1921, pp. 31–38. [Received 31st October 1922.]

The importance of birds in destroying insects is pointed out, and those chiefly concerned in Canada are reviewed.

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